THE MARINE REVIEW

VOL. 47 CLEVELAND JULY, 1917 NEW YORK No. 7

Who? You! Me? Yes! I'm Not the Man

Goethals—Plans Hopeless; Denman—Discussion Inappropriate; Eustis and Clark —Ships Ignored; Goethals—Facts Misstated; Let's Build Ships Not Quarrels

PRESIDENT WILSON, Premier Lloyd George, Premier Ribot, and practically all other statesmen charged with the task of directing the energies of the world's three greatest democracies to the one job of defeating Germany, have taken occasion during the past few months to reveal the real necessity for ships. Their utterances must have aroused the unthinking to a keen appreciation of the need for ships to turn aside Germany's latest and possibly last blow at the economic vitals of her enemies. To the thinking, the warnings were but a confirmation of what they had known. A legislator in the French chamber of deputies a few days ago produced statistics showing that Germany's depredations since the beginning of 1915 had caused the loss of 5,400,000 tons of merchant ships. At the accentuated rate of destruction in the past few months, no doubt remains of how badly ships are needed. Preventive measures, such as increased efficiency of patrols, will help, but basically it is a question of increasing the number of carriers which can transport supplies to the civilian population of our European allies and munitions and supplies to our own and allied armies.

Nearly Half a Billion to Spend

The United States shipping board is the governmental agency upon which much of the burden of furnishing these ships must rest. About $400,000,000 has been made immediately available for its use under Presidential authority and through the instrumentality of the United States Shipping Board Emergency Fleet Corp. The sum allowed is ample to provide for an immense fleet. The German and Austrian tonnage taken over by the government make an effective addition to the available supply of carriers. The requisition of tonnage now building for foreign account puts at the country's command another effective fleet of excellent ships.

Without disparaging the effective work which the shipping board and its newly organized corporation has accomplished, a chronological arrangement of certain perturbing and disquieting facts may be presented. Maj. Gen. George W. Goethals told the leading steel men of the country, at a meeting of the American Iron and Steel institute on May 25, that the original program of the shipping board to turn out wooden ships on an enormous scale was hopeless. He told of the situation when called to the government's service. "I was confronted with the problem of turning out one thousand 3000-ton wooden ships in 18 months," he said. "It was said the steel could not be procured. I found contracts to build these ships had been promised in all directions. When I looked into the plans and specifications, I found none. When we consider that the birds now are nesting in the trees that are to go into these ships, and that these ships must have a speed of about 10½ knots an hour, if they are to escape the submarines, the proposal was simply hopeless. I began a campaign for money. As I regard all boards as long, narrow and wooden, and being a believer in authority, I wanted both money and authority."

A Question of Propriety

Chairman Denman of the shipping board entered the lists the next day with the observation that "If all the ships that can be built within the next 18 months are built, there still will be need for a thousand wooden ships to make good the deficit in our merchant tonnage, even though the German rate of destruction is reduced to half that established in the month of April. I do not know whether a thousand wooden ships can be built in 18 months. There was a hope expressed that we could, and I have carefully avoided denying the possibility of realization of this hope. My reason for not denying it is because I do not care to have our German enemies in Berlin receive that amount of comfort. We believe that the committees of congress, and not a public dinner with the head of the steel trust, are the places for the discussion of matters of policy with regard to shipbuilding."

Then a few days later, F. A. Eustis, assistant general manager of the corporation, and F. Huntington Clark, his assistant, issued statements virtually

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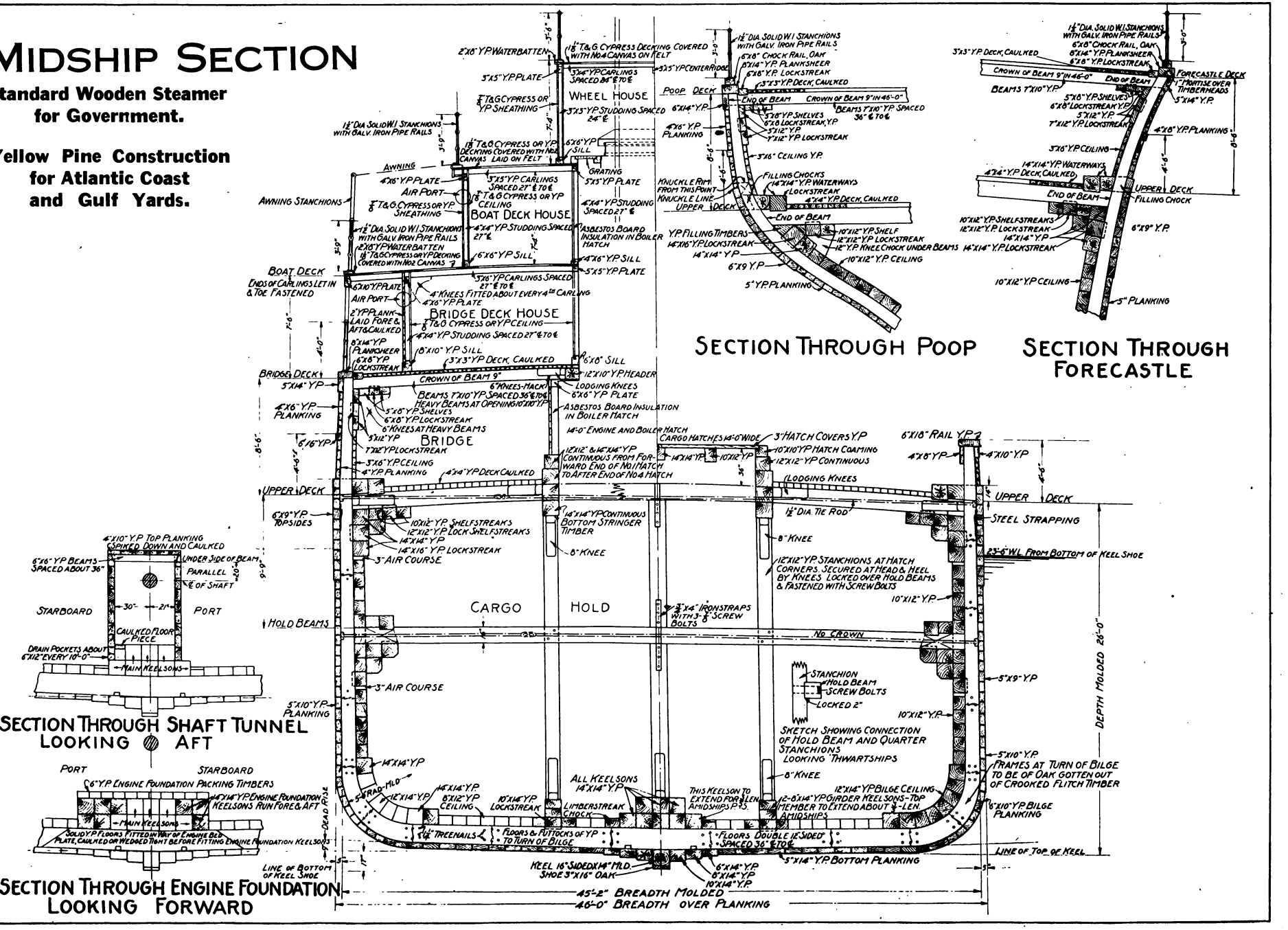
MIDSHIP SECTION

Standard Wooden Steamer for Government.

Yellow Pine Construction for Atlantic Coast and Gulf Yards.


WHEEL HOUSE
BOAT DECK HOUSE
BRIDGE DECK HOUSE
BRIDGE
POOP DECK
CARGO HOLD
BOAT DECK
BRIDGE DECK
UPPER DECK
HOLD BEAMS
AWNING
AWNING STANCHIONS
AIR PORT
GRATING
CROWN OF BEAM 9"
BEAMS 7"X10" Y.P. SPACED 36" C TO C
HEAVY BEAMS AT OPENING 10"X10" Y.P.
14'-0" ENGINE AND BOILER HATCH
CARGO HATCHES 14'-0" WIDE
3" HATCH COVERS Y.P.
10"X10" Y.P. HATCH COAMING
12"X12" Y.P. CONTINUOUS
LODGING KNEES
STEEL STRAPPING
12"X12" Y.P. STANCHIONS AT HATCH CORNERS, SECURED AT HEAD & HEEL BY KNEES, LOCKED OVER HOLD BEAMS & FASTENED WITH SCREW BOLTS
NO CROWN
3" AIR COURSE
8" KNEE
ASBESTOS BOARD INSULATION IN BOILER HATCH
14"X14" Y.P. CONTINUOUS BOTTOM STRINGER TIMBER
12"X12" Y.P. LOCK SHELFSTREAKS
10"X12" Y.P. SHELFSTREAKS
14"X16" Y.P. LOCKSTREAK
6"X16" Y.P. BEAMS SPACED ABOUT 36" PARALLEL ℄ OF SHAFT
4"X10" Y.P. TOP PLANKING SPIKED DOWN AND CAULKED
UNDER SIDE OF BEAM
STARBOARD
PORT
CAULKED FLOOR PIECE
DRAIN POCKETS ABOUT 6"X12" EVERY 10'-0"
MAIN KEELSONS
SECTION THROUGH SHAFT TUNNEL LOOKING ⊗ AFT
6" Y.P. ENGINE FOUNDATION PACKING TIMBERS
14"X16" Y.P. ENGINE FOUNDATION KEELSONS RUN FORE & AFT
SOLID Y.P. FLOORS FITTED IN WAY OF ENGINE BED PLATE, CAULKED OR WEDGED TIGHT BEFORE FITTING ENGINE FOUNDATION KEELSONS
SECTION THROUGH ENGINE FOUNDATION LOOKING FORWARD
ALL KEELSONS 14"X14" Y.P.
KEEL 16" SIDED X 14" MLD.
SHOE 9"X16" OAK
FLOORS & FUTTOCKS OF Y.P. TO TURN OF BILGE
FLOORS DOUBLE 12" SIDED SPACED 36" C TO C
5"X14" Y.P. BOTTOM PLANKING
LINE OF TOP OF KEEL
LINE OF BOTTOM OF KEEL SHOE
45'-2" BREADTH MOLDED
46'-0" BREADTH OVER PLANKING
DEPTH MOLDED 26'-0"
23'-6" W.L. FROM BOTTOM OF KEEL SHOE
SECTION THROUGH POOP
SECTION THROUGH FORECASTLE
FORECASTLE DECK
CROWN OF BEAM 9" IN 46'-0"
END OF BEAM
FILLING CHOCK
SKETCH SHOWING CONNECTION OF HOLD BEAM AND QUARTER STANCHIONS LOOKING THWARTSHIPS
FRAMES AT TURN OF BILGE TO BE OF OAK GOTTEN OUT OF CROOKED FLITCH TIMBER

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charging General Goethals with halting the building of ships by prescribing an impossible form of contract.

Charge Facts Were Misrepresented

The next day their resignations were accepted by General Goethals in a letter in which he stated that they were dropped from the service "for lack of loyalty and misstatement and misrepresentation of facts." The last broadside was fired by Mr. Clark who said that "when General Goethals says that I misstated the facts he is saying something that is not true. I want the country to know that they can have the ships, and they need the ships. I am afraid the country will wake up too late." Mr. Eustis still maintained his connection with the shipping board, his resignation being from the corporation. Chairman Denman has not figured in the Goethals-Clark-Eustis affair, his only comment being that "I have previously indicated my opinion as to places where discussions of such serious character should be initiated. Apparently these gentlemen (Messrs. Eustis and Clark) do not agree with me."

These interchanges of personal opinions as to veracity interest the public only in the irritation they excite over the possibility of delay in building the ships needed. General Goethals, with his record at Panama, stands in the public eye as a man of accomplishment. For that reason, public opinion naturally has been in his favor. The newly created shipping board, with its record still one of the future, has shown outward signs of putting the job up to the Panama canal builder—a contingency which his own statement shows that he desires.

What the Country Wants

The loose reports about discarding the steel-ship program in favor of wood, or the wooden-ship program in favor of steel, mean nothing. The plain facts are that ships of both kinds are needed and will be built, in the maximum numbers possible.

The shipbuilding industry cannot work effectively in the face of public dissension among the men directing its efforts. Ships cannot be evolved from discord. The shipbuilders, steel and lumber manufacturers are demonstrating a desire to co-operate. The nation has a right to expect and demand that this spirit be copied by everyone at Washington.

Steel Corporation Will Build Ships

THE United States Steel Corp. is preparing to enter the shipbuilding field on a large scale through a subsidiary, the American Bridge Co. In support of the offer of co-operation given to Maj. Gen. Goethals, general manager of the United States Shipping Board Emergency Fleet Corp., at the semiannual meeting of the American Iron and Steel institute, the Steel Corporation and other firms will aid the shipbuilding program.

Steel has been contracted for to build 3,000,000 tons of ships. The American Bridge Co. will fabricate 1,000,000 tons; the Lackawanna Steel Co. will furnish steel for another 1,000,000 tons of ships and together with other shops will fabricate this steel. These two orders embrace standard ships of about 5,000 tons each. Another 1,000,000 tons will be furnished by other companies.

Sixty acres of land have been bought by the Steel Corporation in the Hackensack Meadows on Newark bay, where comparatively little dredging will be required to secure sufficient depth of water to get large freighters out to sea by way of Staten island sound. The bridge company has had extensive experience in fabricating steel-ship material. It has furnished fabricated material to the Chester Shipbuilding Co. in

Wooden Yards Needed

A special wire to THE MARINE REVIEW, from Portland, Ore., on June 9 says that "although the curt dismissal of F. A. Eustis and F. Huntington Clark, by General Goethals, has created intense excitement in wooden shipbuilding circles on the Pacific coast, builders are convinced that the government's program will not be materially interfered with. Coast builders already have started work on 30 government vessels. Furthermore, prominent men point out that for every set of ways vacated by the government there are two private owners waiting to buy wooden ships, and it is believed that this applies to all sections of the country."

Contracts for 104 Ships and Hulls Awarded by Shipping Board

The United States Shipping Board Emergency Fleet Corp. announces that it has executed the following contracts for the construction of merchant vessels:

Merrill-Stevens Co., Jacksonville, Fla.: Twelve wooden cargo carrying steamers complete, also four cargo carrying all steel ships complete.

Los Angeles Shipbuilding & Dry Dock Co., P. O. Box 68, Long Beach, Cal.: Eight cargo carrying, all steel ships complete.

G. M. Standifer Construction Corp., Northwestern Bank building, Portland, Oreg.: Ten wooden cargo carrying steamers complete.

Peninsular Shipbuilding Co., Portland, Oreg.: Four wooden cargo vessels complete.

Sloan Shipyards Corp., Seattle, Wash.: Sixteen wooden cargo carrying steamers complete; first steamer to be delivered Jan. 31, 1918; two in February, 1918; four in March, 1918; two in April, 1918; two in May, 1918; two in June, 1918; two in July, 1918.

Grays Harbor Motor Ship Corp., Aberdeen, Wash.: Four wooden hulls; first hull to be delivered Jan. 15, 1918; second Feb. 15, 1918; third, March 15, 1918; fourth, April 15, 1918.

Coast Shipbuilding Co., Portland, Oreg.: Four wooden hulls; first hull to be delivered Jan. 1, 1918; second, March 1, 1918; third, May 1, 1918; fourth, July 1, 1918.

Edward F. Terry & Henry L. Brittian, 60 Broadway, New York City. Works, Moss Point, Miss.: Twenty composite cargo carrying steamers complete. First steamer to be delivered Feb. 1, 1918, and the remaining 19 within next 10 months.

Skinner & Eddy Corp., Seattle, Wash.: Six steel cargo carrying steamers complete. First two steamers to be delivered within five months from date of arrival of keel plates, and of the remaining number of steamers the building of the second two steamers shall be commenced immediately after the completion of the first two steamers and shall be delivered within five months after the laying of the keels, and the building of the remaining two steamers shall be commenced immediately after the completion of the second two steamers and shall be delivered within five months after the laying of the keels.

Sanderson & Porter, 52 William street, New York City. Works: Willapa Harbor, Wash.: Ten wooden hulls; first hull to be delivered on April 1, 1918, and one hull every 15 days thereafter, ending Aug. 30, 1918.

The Maryland Ship Building Co., Lexington building, Baltimore. Works: Sollars Point, Md.: Six wooden hulls; first hull to be delivered April 30, 1918, and one hull to be delivered on the last day of each succeeding month, ending Sept. 30, 1918.

SUMMARY TO DATE:

Total number of contracts executed	12
Total number of ships and hulls contracted for	104
Complete steel ships	18
Complete composite ships	32
Complete wooden ships	30
Total complete ships	80
Wooden hulls	24

(Signed) George W. Goethals,
General Manager.

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addition to building barges at its Pittsburgh plant.

Orders Lumber for 100 Ships

Lumber for 100 wooden ships has been ordered from members of the Southern Pine association by Maj. Gen. George W. Goethals, general manager of the shipping board's Emergency Fleet Corp. The price is $35 a thousand feet at the mills. The orders call for approximately 140,000,000 feet.

"The contracts for these ships have not yet been let," said General Goethals, "but in the regular course of business should be expected to be awarded within the next 60 days. As soon as the contracts are let notification will be forwarded to mills to begin on the timbers and to ship to points where the vessels will be built. Orders for the ships will begin in June, and probably will be entirely placed within 60 days."

Lumber manufacturers of Oregon and Washington at a conference have fixed a price of $35 per 1000 feet for all lumber sold to the government for shipbuilding purposes. The offer was communicated to Washington by long distance telephone. This figure is approximately $5 below the current market quotations on ship timbers and will not apply on lumber sold to private contractors.

First Serious Accident

Of the many accidents which marked the opening of the lake season, only one resulted seriously. The steamers PENTECOST MITCHELL and SAXONA collided head-on in the Soo river on Monday, May 14, and both vessels sank. The collision occurred at Watson's reef, near Pipe island, only a short distance from Detour. The boats are about 1500 feet off Pipe island. The bows of the two steamers are locked together, the pilot houses being only about 20 feet apart in 40 feet of water. A view of the wrecked steamers taken only a short time after the accident, is shown on page 246.

All the members of the crews were saved, the sailors taking to the small boats and reaching Detour. The MITCHELL was downbound with ore. The SAXONA had a cargo of coal shipped by the Northwestern Fuel Co. for Superior. The SAXONA was owned by G. H. Tomlinson, Duluth. She was built in 1903 and is 416 feet long, 50 feet beam and 28 feet deep. Her capacity is about 7000 gross tons. The MITCHELL is owned by the Pittsburgh Steamship Co. and is practically the same size as the SAXONA. The MITCHELL was formerly the H. B. HAWGOOD.

After examination of the wrecks the owners of the steamer SAXONA abandoned her to the underwriters as a constructive total loss. The task of raising the two vessels is a large one but will be undertaken soon. The cost of raising the boats has been estimated at from $75,000 to $100,000, each. A cofferdam will be built around the SAXONA. Both vessels will be out of commission for practically the entire season.

District Officers

The following is a list showing the names and addresses, together with the territory covered by the various district officers of the United States Shipping Board Emergency Fleet Corp.:

Charles N. Crowell, 1316 Carter building, Houston, Tex.; Texas and the Mississippi river.

Warren Johnson, Liverpool, London & Globe building, New Orleans; east of the Mississippi river to Georgia.

W. C. McGowan, 505 Heard building, Jacksonville, Fla.; Virginia to Florida (Atlantic and gulf coasts).

G. R. McDermott, 736 Munsey building, Washington; Chesapeake and Delaware, and Atlantic coast from Philadelphia to Norfolk.

Eads Johnson, 115 Broadway, New York; New Jersey (outside the Delaware river), New York and to east Massachusetts.

W. H. Hand Jr., Customs house, Boston; East Massachusetts to Maine, inclusive.

A. F. Pillsbury, 310 Sansome, San Francisco, Cal.; Pacific coast.

John F. Blain (under Captain Pillsbury), Securities building, Seattle; Seattle and vicinity.

Huge Demand for Lumber

Estimates prepared by the lumber committee of the advisory commission of the council of national defense show that 2,000,000,000 feet may be used for purposes directly connected with the war in the next 12 months. Construction of the 16 cantonments which will house the new army will absorb a large amount of the government's lumber purchases. The cantonments will require about 500,000,000 feet. Second in quantity of lumber required comes the wooden ship building program now estimated at 400,000,000 feet.

"The best estimate that can be made of the total amount of lumber required for purposes of national defense within the next 12 months is 2,000,000,000 feet," says a statement issued by the committee. "This sounds like a colossal figure, and it is a big figure, but should give no apprehension that it will disturb the markets or cause a shortage of lumber. Actually this will not exceed 5 per cent of one year's lumber production of this country. It can readily be seen, therefore, that no lumber user need fear that it will be impossible for him to get the kinds and sizes of lumber needed for his particular purpose. We have the forest resources, and without doubt the producing capacity."

Big Plant at Baltimore

The Baltimore Dry Docks & Shipbuilding Co., Baltimore, has taken an option on the waterfront property of the McLean Contracting Co., adjoining Fort McHenry, for the establishment of a shipbuilding plant that will eventually cost $3,500,000 and will be equipped to turn out eight ships a year, the board of estimates of Baltimore was told recently by Holden A. Evans, president of the company.

Long Island Yard Sold

The ship yard property of James E. Bayles & Son, situated on the east side of Port Jefferson harbor one of the oldest ship yards on Long Island, was sold a few days ago to William B. Ferguson, New York and Bridgeport, Conn., a brother of the president of the Newport News Ship Building & Dry Dock Co. He is also a naval constructor. It is understood that Mr. Ferguson is acting for stockholders of the Newport News company. The yard is being surveyed. It is understood that the new owners will take it over as soon as possible. The purchase price is said to be $50,000.

The Bayles ship yard was started in Port Jefferson 81 years ago and has turned out some of the finest pleasure craft in that part of the country. James E. Bayles has been actively connected with the firm for 57 years.

Elected President

Henry S. Grove has resigned as president of the William Cramp & Sons Ship & Engine Building Co., Philadelphia, and has been succeeded by H. W. Hand, vice president and general manager. Mr. Grove was elected chairman of the board of directors and J. H. Mull, another official of the company, succeeded Mr. Hand.

H. B. Pickering has accepted the position of naval architect and marine superintendent with the Foundation Co., New York. This company was one of the first to prepare to build wooden ships on a large scale. Mr. Pickering formerly was with the William Cramp & Sons Ship & Engine Building Co., and the New York navy yard.

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How Wooden Ships Are Built--II

This Article, Second in a Series Covering Wooden Shipbuilding, Discusses the Strength and Characteristics of Ship Timbers

By H. Cole Estep

BEFORE any attempt is made to lay down or build a wooden ship, the architect, yard superintendent and others responsible for the success of the proposed vessel, should acquire a fundamental knowledge of the physical characteristics and strength of the timbers that will be used in the construction of the hull. An investigation also should be made into the different methods of fastening timbers together in shipbuilding and of the efficiency of such fastenings. In other words, a little knowledge of the elements of structural engineering is as essential to the shipbuilder as it is to the building contractor or bridge erector.

For an intelligent and thorough grasp of the subject it is necessary, in fact, to start with the lumber industry, which bears the same relation to wooden shipbuilding as iron-ore mining does to the manufacture of steel. In this article, therefore, a few facts will be presented regarding the production of lumber in the United States, together with data on the physical characteristics and strength of various species of ship timbers.

In the preceding article, figures covering the supply of merchantable timber in the United States and Canada were presented. To give an idea of the ability of lumber manufacturers to furnish ship timbers in quantity, it may be stated that the United States forest service has estimated the lumber production of the United States in 1915, the latest year for which figures are available, at 37,013,294,000 board feet. During 1915 there were 29,941 mills in operation. The details of the lumber cut of 1915, showing the number of mills and production of each state are given in Table III. By an inspection of this table, it is possible to estimate the production of the two principal kinds of ship lumber, namely, Douglas fir and southern yellow pine. The pine growing states turned out 17,010,000,000 feet and the fir states, 5,640,000,000 feet in 1915. In 1916, the production of the fir states was approximately 7,000,000,000 feet. About 25 per cent of the Pacific coast cut is available for ship work. In other words, as far as lumber supply is concerned, the Pacific coast mills alone can turn out sufficient material for one thousand 3000-ton ships in a year and the southern mills, because of the smaller size of pine timbers, enough for 1800 to 2000 more.

Southern yellow pine is the most abundant of all ship materials, and on account of its wide geographical distribution, comparatively close to the great eastern centers of population, it is extensively employed in building wooden vessel of all kinds. It comes in sufficiently large sizes so that the principal elements of the ship's structure, such as the frames, planking and ceiling can be worked up in a comparatively few pieces, without the necessity of resorting to an abnormal number of butts and scarfs. Yellow pine is an even grained, easily worked, dense wood with superior physical characteristics. Detailed figures on the strength of pine timbers are given in Tables I, II and IV.

Pine is an unusually durable wood, even when subjected to long continued stresses in a ship's structure. In the tables just referred to, the modulus of rupture, or breaking strength, of southern pine is given as varying from 6437 to 5948 pounds per square inch for the green material and 7033 to 5957 pounds for air-seasoned timber. The weight per cubic foot varies from 38.6 to 31.4 pounds. Ships constructed of southern pine along the Atlantic and gulf coasts have a special strength advantage, in that, up to date, natural crooks have been used for the curved frame members in nearly all cases. Such timbers are appreciably stronger than the sawed

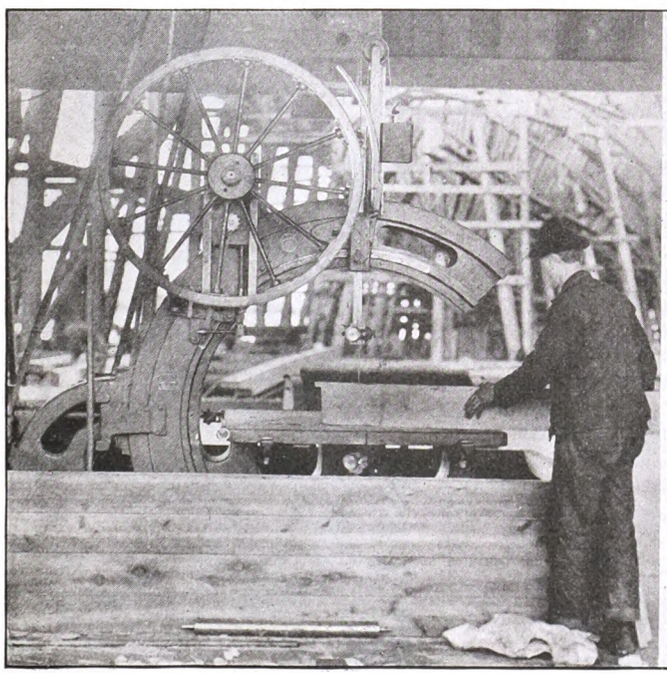

FIG. 8—FASHIONING SHIP TIMBERS ON A BAND SAW

FIG. 9—SPECIAL MACHINES HAVE BEEN DESIGNED FOR BEVELING AND EDGING TIMBERS

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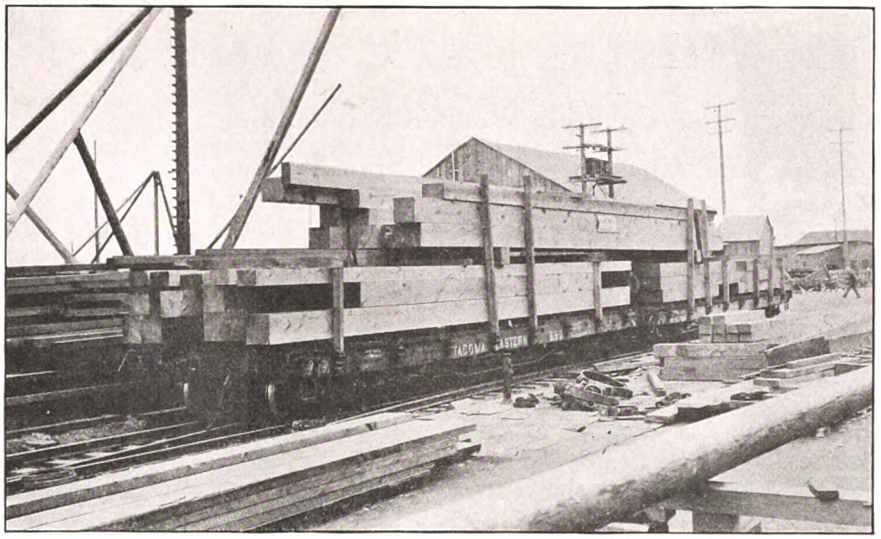

FIG. 10—TIMBERS LONG ENOUGH TO REQUIRE TWO CARS FREQUENTLY ARE NEEDED IN WOODEN SHIPBUILDING

frame construction. As a material which is suitable for ship construction, Douglas fir, grown on the Pacific coast, is fully as important as yellow pine, and on account of the exceptionally large size of the trees, and the relative lightness of the wood, this timber has peculiar advantages of its own. Concerning this wood, the United States forest service, in Bulletin No. 88, has put itself on record as follows:

"Douglas fir may perhaps be considered the most important of American woods. Though in point of production it ranks recond to southern yellow pine, its rapid growth in the Pacific coast forests, its comparatively wide distribution and the great variety of uses to which its wood may be put, place it first. As a structural timber it is not surpassed and probably it is most widely used and known in this capacity."

Fir an Important Wood

Douglas fir comprises more than 25 per cent of the standing timber supply of the United States, including both hard and soft woods. The timber stand of Washington and Oregon is such as to insure a permanent source of supply of the highest class of lumber for shipbuilding. Also, the winter climate in this vast, western timber-belt is mild, enabling the lumber camps and mills to operate continuously, thereby producing a steady supply of manufactured products.

Practically all log transportation is by water and many of the mills are located on tidewater, in close proximity to shipbuilding plants. These conditions make it possible to produce lumber for ship construction at a minimum operating cost.

Pacific coast logging operators are provided with equipment specially adapted for handling large logs. Under the ordinary methods of procedure, the logs are hauled out from the places where the trees are felled by steel cables operated by powerful hoisting engines. This operation is termed yarding. The yarded logs are usually rolled onto flat cars or specially constructed trucks, on which they are hauled to the water, either a river or tidewater. Here they are made up into rafts and towed to the mills. To some mills, of course, the logs are delivered direct by rail.

Big Timbers are Cut

The mills on the Pacific coast are equipped with extra heavy facilities for handling big logs and getting out big timbers and heavy planks specially suited to ship construction. Both large circular and band saws are used to work up the logs, while heavy planing mills are provided to dress the timbers. The modern mills are also completely provided with power-driven roller tables and transfers for handling the lumber during the process of manufacture. The accompanying illustrations show the essentials of the logging and lumbering operations on the Pacific coast.

Douglas fir trees grow commonly from 3 to 5 feet in diameter and from 175 to 250 feet high. Tremendous timbers, particularly suited to shipbuilding, therefore are available in quantity. Structural timbers of Douglas fir, 18 x 18 inches in section and 120 to 140 feet long, may be obtained from mills at any time, and timbers 36 inches square and 80 or 90 feet long are equally available. By the use of such timbers, the largest boats can be constructed with a minimum of splicing and scarfing, which not only reduces labor costs but materially increases the strength or seaworthiness of the vessel.

Douglas fir has an average specific gravity of 0.53 based on its oven dry volume. The specific gravity based on green volume, before shrinkage, is 0.46; based on air-dry volume it is 0.48. The green wood weighs 38 pounds per cubic foot, or 3.166 pounds per board foot and the air-dry wood 34 pounds per cubic foot or 2.836 pounds per board foot. These weights vary in fir as in other woods but the foregoing figures are reliable averages. A knowledge of these figures is indispensable to the naval architect or shipbuilder, in computing the weights, trim and displacement of his vessel. The method of figuring these weights will be brought out later in this series. Too many wooden ships at the present time are constructed and trimmed by guesswork, resulting in some exceedingly costly experiences for the shipowner.

Preservatives are Recommended

Douglas fir and southern pine are on a par as to durability, although like other woods when used for shipbuilding, precautions should be taken at the time the boat is constructed to see that preservatives are effectively applied and that the necessary amount of ventilation is supplied to prevent the collection of moist, stagnant air in any part of the vessel. For preserving the timber, common salt is frequently introduced between the frame joints and between the frame members and the planking and ceiling. Most modern shipbuilders, however, prefer creosote, carbolineum, or some similar compound applied with a brush or old broom to the joints during the process of construction.

On account of differences of opinion recently voiced regarding the advisabil-

FIG. 11—BORING HOLES WITH AN AIR DRILL

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Table I

Average Strength Values for Structural Timbers

GREEN MATERIAL

Taken from United States Forest Service Bulletin 108

Species	Cross section under test. In.	No. of tests	Rings per inch	Moisture content. Per cent	Weight per cu. ft. oven-dry. Lbs.	Fiber stress at elastic limit per sq. in. Lbs.	Modulus of rupture per sq. in. Lbs.	Modulus of Elasticity per sq. in. lbs.	Relative strength based on modulus of rupture. Douglas fir = 100 per cent. Per cent	Relative stiffness based on modulus of elasticity. Douglas fir = 100 per cent. Per cent	—Knots in stringers tested— Vol. I (See Fig. 14) Less than 1½ in.	Vol. I (See Fig. 14) 1½ in. and over	Vol. II (See Fig. 14) Less than 1½ in.	Vol. II (See Fig. 14) 1½ in. and over	Vol. III Less than 1½ in.	Vol. III 1½ in. and over
Douglas fir	8x16	134	10.9	31.8	28.9 (132)	4,282 (133)	6,605	1,611	100.0	100.0	1.2	0.5	1.7	0.7	10.0	3.3
Long-leaf pine	12x12 10x16 8x16 6x16 6x10	13	14.6 (12)	29.2	35.4	3,855	6,437	1,466	97.4	91.0	0.4	0.2	0.5	0.2	4.0	1.1
Short-leaf pine	8x16 8x14 8x12	33	12.3	48.4	31.4	3,376 (31)	5,948	1,546 (31)	90.0	96.0	0.4	0.1	0.1	0.1	2.4	1.2
Western hemlock	8x16	27	17.6	41.9	28.1	3,761	5,821	1,489	88.1	92.4	0.7	0.7	1.5	0.4	3.4	2.3
Loblolly pine	8x16 5x12	78	6.2 (68)	58.0 (55)	31.2 (55)	3,266	5,568	1,467	84.4	91.1	0.2	0.2	0.3	0.7	4.6	3.7
Western larch	8x16 8x12	43	23.9	50.5	28.7	3,677	5,562	1,364	84.2	84.6	0.9	0.2	2.3	0.6	10.9	1.3
Redwood	8x16 6x12 7x 9	30	19.5	90.2	23.3	4,323	5,327	1,202	80.6	74.6	0.9	0.1	1.6	1.3	8.3	3.6
Tamarack	6x12	11	16.7	56.9	29.3	3,231	4,984	1,268	75.5	78.7	0.9	0.4	1.4	0.4	8.4	0.7
Norway pine	6x12	11	13.2	52.1	25.2	2,397	3,767	1,042	57.0	64.7	2.5	1.8	2.8	2.5	14.0	8.7

Note—Subscript numbers indicate number of tests when different from that shown in column "Number of Tests."

Table II

Average Strength Values for Structural Timbers

AIR-SEASONED MATERIAL

Taken from United States Forest Service Bulletin 108

Species	Cross section under test. In.	No. of tests	Rings per inch	Moisture content. Per cent	Weight per cu. ft. oven-dry. Lbs.	Fiber stress at elastic limit per sq. in. Lbs.	Modulus of rupture per sq. in. Lbs.	Modulus of Elasticity per sq. in. lbs.	Relative strength based on modulus of rupture. Douglas fir = 100 per cent. Per cent	Relative stiffness based on modulus of elasticity. Douglas fir = 100 per cent. Per cent	—Knots in stringers tested— Vol. I (See Fig. 14) Less than 1½ in.	Vol. I (See Fig. 14) 1½ in. and over	Vol. II (See Fig. 14) Less than 1½ in.	Vol. II (See Fig. 14) 1½ in. and over	Vol. III Less than 1½ in.	Vol. III 1½ in. and over
Douglas fir	8x16	64	15.2	20.9	27.8	4,931	7,142	1,641	100.0	100.0	0.5	0.1	1.2	0.2	12.1	0.9
Long-leaf pine	8x16 6x16 6x10	7	12.7	21.6	38.6	3,793 (6)	5,957	1,720	83.6	104.8	None	None	None	None	None	None
Short-leaf pine	8x16 8x14 8x12	9	12.3	16.3	32.1	5,186	7,033	1,782	98.5	108.6	None	None	0.2	0.5	2.8	1.6
Western hemlock	8x16	31	17.5	17.7	28.4	4,828 (30)	7,109	1,805 (30)	99.6	110.0	0.3	0.1	1.6	0.5	8.0	0.7
Loblolly pine	8x16 6x16 6x10 8x 8	21	6.5	21.1	33.1	3,706	6,259	1,521	87.7	92.7	0.4	1.1	0.4	0.8	2.8	3.4
Western larch	8x16 8x12	36	23.0	18.2	29.8	3,904	6,534	1,561	91.5	95.1	1.8	0.3	3.2	0.6	19.4	1.6
Redwood	8x16 6x12 7x 9	12	18.1	17.3	22.2	3,747 (7)	4,573	946 (7)	64.1	57.6	0.1	None	0.8	0.3	3.0	1.3
Tamarack	6x12	4	16.6	23.4	30.8	3,643	5,865	1,385	82.3	84.4	1.8	None	0.8	None	18.0	0.5
Norway pine	6x12	4	7.8	17.0	26.4	2,928	5,255	1,103	73.7	67.2	3.5	1.5	2.3	0.5	17.5	9.3

Note—Subscript numbers indicate number of tests when different from that shown in column "Number of Tests."

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ity of building wooden boats of green timber to meet the present submarine emergency, the following data on the shrinkage of Douglas fir, from a pamphlet by Howard B. Oakleaf, United States forest service, Portland, Ore., are presented:

"Douglas fir does not shrink much, and for this reason it is possible to use partially dried material in emergencies, without fear that the additional drying after the material has been shaped will open the seams or cause undesirable stresses in the members. The following figures are given for the information of those desiring to know the amount that Douglas fir will shrink under normal conditions from green to air dry: Radially, 1.52 per cent, tangentially, 2.37 per cent, and longitudinally, 0.0091 per cent." Tables I and II will be found to contain complete data on the strength of the principal American woods used for shipbuilding and other structural purposes. While it is difficult to obtain correct comparisons of the strength properties of structural timbers, yet, from a practical point of view, the full structural sizes furnish the data sought by naval architects and shipbuilders to guide them in their designs.

For Tables I and II we are indebted to the West Coast Lumbermen's association, Seattle, O. P. M. Goss, consulting engineer. In the preparation of the tables, showing the various properties of structural timbers, every effort was made to obtain the most reliable and up-to-date figures. In all comparisons, consideration was given to the size of the timbers, general quality, moisture condition and other factors which affect the strength. Many publications have presented data containing strength values for structural timbers, but in many cases the timbers have been unlike in grades and have varied materially in moisture content. Due to such variations, comparisons, in many cases have been very misleading. This point has been recognized in preparing the accompanying data, and every effort was made to eliminate comparisons that were not on the same basis.

All species of timber show variations in weight and strength. These variations are considerable in some cases, depending on the quality of the clear wood, as well as on the grade and condition of seasoning of the timber. It is essential that the quality of the timbers of any species be determined by due consideration of these factors, rather than locality of growth, etc.

Table IV probably contains the best available data published in any government bulletin covering the strength of different species of structural timber, The data in this table are taken from United States forest service bulletin No. 108, page 65. This table shows the results of tests on a large number of stringers, similar to ship keelson timbers, of different species, graded by the tentative grading rule of the forest service. All the timbers were practically of the same grade. The modulus of rupture of Douglas fir is given as 6919 pounds per square inch; the corresponding figure for long leaf pine is 6140 pounds per square inch.

The dry weight of small, clear specimens, particularly for wood containing little or no resinous substance, is a definite indication of the strength of the wood fibre. This fact is shown for Douglas fir in United States forest service bulletin No. 108, in which it is stated that with an increase in dry weight of from 19 to 36 pounds per cubic foot, there is an accompanying increase in strength (modulus of rupture) of from 5500 to 10,500 pounds per square inch. These figures indicate increases of 47.2 and 47.7 per cent respectively for weight and strength, based on the maximum values. In timbers of structural sizes, however, such as are used in shipbuilding, this law does not hold good on account of the influence of the knots on the strength. In such cases, the relation between dry weight and strength is erratic.

A knowledge of timber grading is essential to the shipbuilder. Different grading rules are used in different parts of the country, and detailed rule books may be procured from the various lumber associations. On the Pacific coast, the standard grade used at present to secure high grade structural timbers is "Selected Common". This grade covers timbers selected from the grade known as "No 1 Common". No. 1 Common is described as follows:

"This grade shall consist of lengths 8 feet and over (except shorter lengths as ordered) of a quality suitable for ordinary constructional purposes. Will allow a small amount of wane, large sound knots, large pitch pockets, colored sap one-third of the width and one-half the thickness, slight variation in sawing and slight streak of solid heart stain. Defects to be considered in connection with the size of the piece. Discoloration through exposure to the elements or season checks not exceeding in length one-half the width of the piece, shall not be deemed a defect excluding lumber from this grade, if otherwise conforming to the grade of No. 1 Common."

From the foregoing specifications for No. 1 Common, the following specification for Selected Common, suitable for high class constructional purposes, including bridge timbers, floor joists, ship timbers, etc., designed to carry heavy

Table III

Lumber Cut of the United States for 1915 by States

From Data Compiled by the United States Forest Service

State	No. of mills active	Production in thousand board feet	State	No. of mills active	Production in thousand board feet
Washington	440	3,950,000	New York	1,600	475,000
Louisiana	500	3,900,000	Ohio	850	400,000
Mississippi	1,250	2,200,000	Missouri	850	350,000
North Carolina	2,900	2,000,000	Indiana	750	350,000
Texas	500	1,850,000	Montana	104	328,000
Arkansas	1,150	1,800,000	Vermont	500	260,000
Oregon	410	1,690,000	Massachusetts	400	250,000
Alabama	1,350	1,500,000	Oklahoma	225	230,000
Virginia	2,400	1,500,000	Maryland	400	165,000
Wisconsin	600	1,300,000	Illinois	350	110,000
California	150	1,130,000	Connecticut	200	90,000
Florida	400	1,110,000	Colorado	144	79,500
Michigan	600	1,100,000	Arizona	14	75,915
Minnesota	450	1,100,000	New Mexico	43	65,787
West Virginia	950	1,100,000	New Jersey	250	40,000
Maine	900	1,000,000	Iowa	125	35,000
Georgia	1,400	1,000,000	Delaware	75	25,000
Pennsylvania	1,900	950,000	South Dakota	29	23,800
South Carolina	800	800,000	Wyoming	74	17,400
Tennessee	1,800	800,000	Rhode Island	25	15,000
Idaho	210	777,000	Utah	73	10,892
Kentucky	1,300	560,000			
New Hampshire	500	500,000	Totals	29,941	37,013,294

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FIG. 12—TYPICAL LUMBERING SCENES IN THE NORTHWEST

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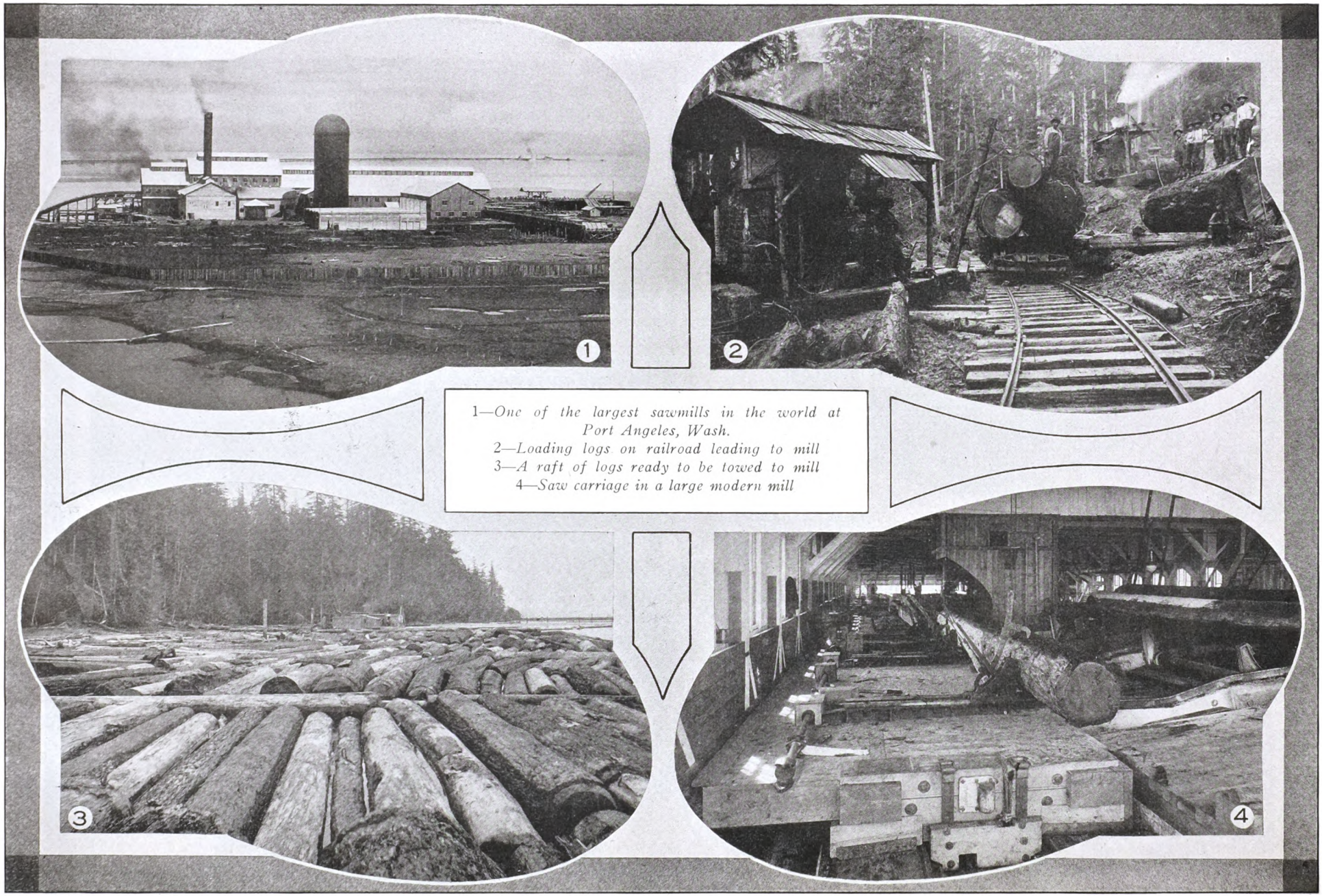
1—One of the largest sawmills in the world at Port Angeles, Wash.
2—Loading logs on railroad leading to mill
3—A raft of logs ready to be towed to mill
4—Saw carriage in a large modern mill

FIG. 13—WEST COAST LUMBERING REQUIRES SPECIAL HEAVY DUTY EQUIPMENT

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loads most satisfactorily, is deduced:

"Selected Common is a grade selected from No. 1 Common and shall consist of lumber free from defects that materially impair the strength of the piece, well manufactured and suitable for high class constructional and structural purposes."

Considerable more information might be presented on the strength and physical characteristics of ship timbers, but enough has been included to embrace the fundamental facts, and for more exhaustive data the reader is referred to civil engineering hand books and to the various special booklets on structural timber, such as that issued by the West Coast Lumbermen's association. It might be added, however, that a safe fibre stress for fir or pine, is considered to be from 1600 to 1800 pounds per square inch in tension, 1600 pounds for compression parallel to the grain, and 400 pounds for compression across the grain. The weaknesses introduced by the practice of sawing out the bilge turns in the frame timbers of large ships are indicated by the great variation in the last two sets of figures.

How Timbers are Shaped

Before going on into the design and construction of ships in detail, it is advisable briefly to consider the methods of shaping and fashioning timbers for ship construction and also the principal methods of fastening the various elements together. The data about to be presented is of a purely general character. More detailed methods of working up timbers and fastenings will be considered later.

Generally speaking, timbers are shaped by sawing, chopping, planing and boring. As far as possible, in modern wooden shipyards, machines are supplanting hand labor for all of these operations. Band saws or jig saws, together with common circular saws are used for a great variety of operations. Air-driven boring augers are used and special machines have been developed for beveling timbers and performing other operations peculiar to shipbuilding. In many cases, however, hand tools must be used, as for instance in dubbing-off the inside of the hull preparatory to laying the ceiling. For many operations such as this, the adz is indispensable. For rough hewing, axes are employed, while hand planes, bits, chisels, and all the tools found in the carpenter's kit also are utilized.

For fastenings, dowels, treenails, drift bolts, spikes and screw bolts are employed. The various pieces may also be scarfed, that is, beveled together, so as to add to the strength of the joint.

Treenails are usually 1¼ inches in diameter and from 26 to 30 inches long. They are made of hard wood, usually locust, and are used chiefly for fastening the planking and ceiling to the frames. For this purpose a hole the scant diameter of the treenail is bored in the members to be fastened and the treenail is driven home with an air hammer. After it is in place, it is cut off, split on the end, and wedged to a tight fit. The subsequent action of the water is supposed to swell the treenail and make it fit tighter.

Although treenails are used extensively in modern shipbuilding, there is doubt as to their efficiency after the ship has had an opportunity to work in a seaway. Undoubtedly, however, they were employed in the construction of the ark, for want of knowledge of more modern fastenings, and this is a sufficient recommendation for their continued use in the eyes of many old-line shipbuilders. The chief virtue of treenails seems to lie in the fact that they work with the ship, and therefore do not present as unyielding a resistance as a steel fastening.

To supplement treenails, however, in fastening the main members of wooden ships together, steel or iron drift-bolts are used. Usually they are about 1-inch in diameter. They are generally driven by air hammers in holes bored ⅛-inch smaller in diameter than the bolt. Although the difference between the size of the hole and that of the bolt is small, they hold tenaciously, especially when the ship is new. It is said that drift-bolts driven 3 feet into a fir timber hold so fast that they break in tension before they pull out. Wherever possible such bolts are driven through and clenched on steel rings in the inside.

For "sticking" the planking to the frames and other preliminary fastenings, as well as for securing the deck planks, galvanized standard ship spikes are used. Usually they are ½-inch square and 8 or 10 inches long. Screw bolts also are used for some forms of fastenings, as well as bolts fitted with washers and nuts. The latter may be taken up from time to time as required.

Table IV

Average Strength Values for Structural Timbers

(Grade 1, Tentative Grading Rules, U. S. Forest Service)

GREEN MATERIAL

Results Taken from United States Forest Service Bulletin 108, Page 65, Table 8

Species	No. of tests	Fiber stress at elastic limit per sq. in. Pounds	Modulus of rupture per sq. in. Pounds	Modulus of elasticity per sq. in. 1,000 pounds	Relative strength based on modulus of rupture. Douglas fir = 100 per cent. Per cent	Relative stiffness based on modulus of elasticity. Douglas fir = 100 per cent. Per cent
Douglas fir	81	4,402	6,919	1,643	100.0	100.0
Longleaf pine	17	3,734	6,140	1,463	88.7	89.0
Loblolly pine	45	3,513	5,898	1,535	85.3	93.4
Shortleaf pine	35	3,318	5,849	1,525	84.5	92.8
Western hemlock..	26	3,689	5,615	1,481	81.1	90.2
Western larch ...	45	3,662	5,479	1,365	79.2	83.1
Tamarack	9	3,151	5,469	1,276	79.0	77.7
Redwood	21	4,031	4,932	1,097	71.3	66.8
Norway pine	17	3,082	4,821	1,373	69.6	83.6

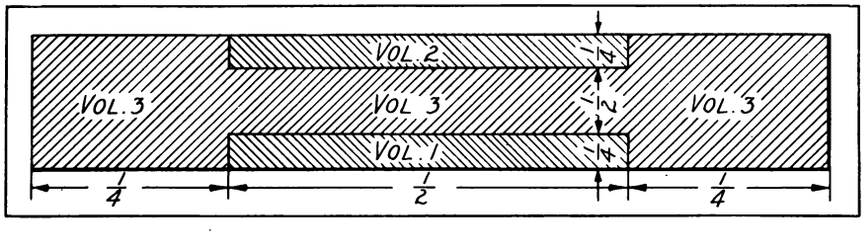

FIG. 14—DIVISION OF STRINGER INTO VOLUMES FOR CONSIDERATION OF POSITIONS OF KNOTS—SEE TABLES I AND II

Tests of Spikes

Some tests of spikes were made at the Seattle testing laboratory of the United States forest service recently, from which the following conclusions were drawn:

1—The form of the point of the common spike is such that it inclines not to follow the hole.

2—If the holes are not too large and the spikes follow the holes closely, the resistance to withdrawal usually will be increased.

3—If spikes do not follow the holes, the resistance to withdrawal may be greatly reduced.

4—Spikes driven close to the holes, but not into them, will have their resistance lowered.

In modern wooden vessels built on the coasts of the United States, considerable use is made of edge-bolting to fasten the various keel and keelson elements and the strakes of ceiling to-

(*Concluded on page 257*)

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What the Government is Doing

Rulings on Marine Matters — Improvements to Waterways

Hints to Navigators

U. S. to Train New Ships' Officers

THE problem of securing an adequate supply of carefully trained ships' officers—already insufficient in certain districts—has become of even greater importance owing to the certainty that American shipyards will turn out vessels in constantly increasing numbers for months to come. The officials at Washington have been studying this question and an announcement just made by the committee on public information reveals their plans. The United States shipping board and the department of commerce are co-operating to obtain the large number of officers needed to operate the great fleet of merchant ships to be provided for the war emergency. A director of recruiting has been appointed and is now at work gathering together the force to form the material from which the future officers will come.

The United States shipping board and the department of commerce issued this statement jointly:

"Henry Howard, Boston, has been appointed director of recruiting under the shipping board, and will conduct a campaign for men out of whom we expect to make ship's officers and engineers and mate's and engineer's assistants. The headquarters of this campaign will be at the Boston customhouse. Already a large number of recruits have been obtained without much publicity.

"We recognize that there are many men with nautical experience, who are good potential material for officers.

"It is estimated that there will be needed four deck officers for each ship and four engine-room officers to care for the ships' building. This totals 8000 officers needed, and the German ships taken over, and ships under construction will bring the required number of officers we must have to 10,000.

Nautical School at Boston

"The work started June 4 with a nautical school near Boston, where a considerable number of recruits have volunteered and will begin to receive instruction. They will be given an intensive course of training in the essential and practical matters of knowledge regarding navigation. The instructors are headed by Dean Alfred E. Burton, of the Massachusetts Institute of Technology, himself a practical navigator and a former member of the United States coast and geodetic survey. The others will be drawn from the staff of the Institute of Technology, and from explorers, navigators and former members of the coast and geodetic survey staff. All will be thoroughly practical men. The secretary of commerce has offered to assist through the trained officers of the steamboat-inspection service.

"The technical instruction will be followed by actual experience on the bridge and in the engine room, 'splitting watches' with those who are already qualified. The first period of instruction will be given along the coast from eastern Maine to Norfolk. At present it is intended to establish 15 of these schools at once. In the winter season it is likely the instruction will be moved to the milder climate of the south.

Work Very Attractive

"The work is a very attractive proposition. Current wages are about $250 a month for mates and $350 for captains, with the war bonus in addition. While we are training a man at sea he will be paid a reasonable compensation. It is thought that in two months at the outside we can take a man of good understanding and some foundation of nautical knowledge and make a competent officer of him, in the main essentials, sufficiently as to do practical work.

"The applicants need not be of any particular age. There is no reason why a well qualified man of 50 should not enter the schools and be made into an officer, provided he is able to pass a physical examination. Those who can not do this as a first requisite will, of course, be rejected. Only men who are in fine physical condition can be used.

"Plans for the Pacific coast and the Lakes region have not yet been matured. It is proposed to get the 15 schools along the eastern shore in operation before any extension of the work is made.

"It is not thought that there will be the slightest difficulty in obtaining sufficient men. There are many who have had experience as sailing masters, or who have had practical experience in one way or another as regards the sea, who form a mass of material for the schools to draw from.

"It is proposed to take men who have had some sea or engineering experience and to give them a period of intensive training. Officials recognized that there will be a tremendous demand for capable men to officer the new fleets of the merchant marine but as the ships are launched, it is proposed to have the officers ready to take charge of them.

"According to figures of the census bureau, the total number of males engaged in water transportation and in selected occupations under water transportation in 1910 was 148,091. Of the selected occupations the following figures are given: Captains and masters, 7985; mates, ship or boat, 2373; pilots, 2834; engineers, ship or boat, 13,584; machinists, 727; firemen, ship or boat, 8245; sailors, 19,750; deckhands, 12,043, and oilers, ship or boat, 1391. The bureau declined to make an estimate on the present numbers, there being such a wide variation in averages between the census of 1910 and the preceding one, as regards this class of men, that there is no tangible basis to go upon.

Has Hearty Co-operation

"The graduates will be examined for licenses by the steamboat inspectors of the department of commerce, and after receiving licenses will be assigned to practical work on merchant ships as fast as they are graduated—taken on to feel their way in responsibility and practical use of their knowledge—and in the work of co-operating with us there has been a cordial response in every line.

"This recruiting service has the hearty co-operation of George Uhler, supervising inspector general of the steamboat-inspection service, who has assigned Supervising Inspector Eugene O'Donnell, of the fifth district, with headquarters at Boston, to assist Director Howard in every way.

"Secretary Redfield, of the department of commerce, is also making every effort to aid the campaign, and has offered to co-operate with the director

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and committee through all the available force and equipment of the coast and geodetic survey and the lighthouse and navigation bureaus."

Lights on Wrecks

The following notice and instructions to mariners has been issued by Lieut. Col. H. Burgess, engineer officer in charge of the St. Marys river improvements:

The lighthouse bureau has marked with two red spar buoys, carrying red lights at night, the channel back of Pipe island opposite and above the wrecks of the steamers PENTECOST MITCHELL and SAXONA. The wrecks lie about 1,500 feet south by west of Pipe island light, with stacks and spars showing above water, and are marked at night by lights maintained by the owners.

The available channel between the wrecks and the Pipe island bank, measured at right angles to the sailing line, has a clear width of only about 500 feet, of which width about 400 feet is on the easterly side and 100 feet is on the westerly side of the chart vessel course. Masters are warned that vessels must not meet or pass each other in the immediate vicinity of the wrecks.

The coast-guard service has designated the small tug MINTA K as a special patrol vessel to oversee the passage of vessels in accordance with the St. Marys River rules. The patrol tug displays by day a U. S. coast guard flag and by night a vertical hoist of a red light above a white light. Masters are requested to cooperate with the patrol tug in keeping the channel clear, and are notified that failure to comply with signals from that vessel will be punishable by the penalty prescribed by law.

Analyzes Pilotage Laws

The first concise and comprehensive analysis of the pilotage laws of this country has just been issued by the bureau of foreign and domestic commerce, of the department of commerce. Various aspects of the pilotage systems in force in the several states have from time to time been the subject of much discussion, which has given rise to numerous bills in congress looking toward the extension of federal legislation on pilotage. Extended hearings have been held on this subject, but there has never been a complete analysis of the laws of the several states. The purpose of this report is to supply such an analysis and to present it in comparative form, so that a knowledge of the essential points may be gained readily and comparisons be easily made.

The report is based chiefly upon the laws of the several states and upon the administrative regulations that have been issued by the local pilotage authorities in the different jurisdictions. In addition, the author of the report, Special Agent Grosvenor M. Jones, visited a number of the larger ports and discussed with pilotage authorities, local pilots, and business and insurance men many practical matters connected with the subject.

The report is entitled "Pilotage in the United States", Special Agents Series No. 136. It may be purchased for 15 cents from the superintendent of documents, Washington.

Drop Lighthouse Bills

The two bills introduced by Senator Nelson of Minnesota, affecting keepers of lighthouses and employes of the bureau of lighthouses and lighthouse service, will probably be sidetracked at this session of congress. Both measures passed the senate at the previous session of congress, but were not acted upon by the house. Both will have to go through both branches of congress before they become laws. They are expected to pass at the next session of congress. The reason given for the plan not to bring them up at the present session is that congress will deal exclusively with war legislation. Those engaged in the lighthouse service maintain that these measures are in themselves war bills.

One bill provides that all officers and employes of the bureau of lighthouses and the lighthouse service who shall have reached the age of 65 years, after having been 30 years in the active service of the government, may, at their option, be retired. Those who have reached the age of 70 years shall be compulsorily retired. It is provided that the annual compensation of those retired shall be one-fortieth of the last annual pay received for each year of active service in the government, not to exceed in any case thirty-fortieths of the last annual pay received. Further provision is made that such retirement pay shall not include any amount on account of subsistence or other allowances.

The other bill authorizes the secretary of commerce to regulate the salaries of keepers of lighthouses "in such manner as he deems just and proper, but the whole sum allowed for such salaries shall not exceed an average of $700 to each keeper."

Lakes Not Affected

The associate editor of THE MARINE REVIEW at Washington, D. C., on June 11, wired that "the Great Lakes are not affected in any way with regard to the government's plans for training officers. Schools to be established are for the purpose of giving education in navigation to those with limited experience who are needed for ships now being built and to be built under the direction of the shipping board. Training is preliminary to examination by steamboat-inspection service. Executive committee, board of supervising inspectors, steamboat-inspection service, is now meeting with a view of making certain changes with reference to the experience necessary before securing an officer's license. The committee, on June 9, adopted a resolution striking out until further notice those sections of rules and regulations applying to lakes, bays and sounds, except the Great Lakes, and notifying local inspectors that hereafter in issuing licenses to officers they may exercise the judgment and discretion vested in them by law without regard to experience now required by rules and regulations. When the candidate applies for examination, the inspectors will determine whether or not he has had sufficient experience."

May Lake Levels

The United States lake survey reports the stages of the Great Lakes for the month of May, 1917, as follows:

Lakes	Feet above mean sea level April	May
Superior	602.28	602.38
Michigan-Huron	580.78	581.14
St. Clair	575.21	576.07
Erie	572.57	572.93
Ontario	246.24	246.51

Lake Superior is 0.10 foot higher than last month, 0.42 foot higher than a year ago, 0.47 foot above the average stage of May of the last 10 years, 0.67 foot below the high stage of May, 1861, and 1.56 feet above the low stage of May, 1911. During the last 10 years the May level has averaged 0.3 foot higher than the April level and 0.4 foot lower than the June level.

Lakes Michigan-Huron are 0.36 foot higher than last month, 0.70 foot higher than a year ago, 0.65 foot above the average stage of May of the last 10 years, 2.38 feet below the high stage of May, 1886, and 1.58 feet above the low stage of May, 1896. During the last 10 years the May level has averaged 0.3 foot higher than the April level and 0.3 foot lower than the June level.

Lake Erie is 0.36 foot higher than last month, 0.07 foot higher than a year ago, 0.15 foot above the average stage of May of the last 10 years, 1.49 feet below the high stage of May, 1862, and 1.62 feet above the low stage of May, 1901. During the last 10 years the May level has averaged 0.4 foot higher than the April level and 0.1 foot lower than the June level.

Lake Ontario is 0.27 foot higher than last month, 0.62 foot lower than a year ago, 0.36 foot below the average stage of May of the last 10 years, 2.44 feet below the high stage of May, 1870, and 1.55 feet above the low stage of May, 1872.

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Will Ice Breakers Aid Lake Trade?

Representative Lake Executives Discuss Plan of Opening Navigation Season on Fixed Date—Some Declare Project Impracticable, While Others Think it Should be Pushed Through

THE request made by THE MARINE REVIEW in its June issue for a free discussion of the project to exert a closer control over the forces which obstruct the opening of the Great Lakes navigation season, has brought out a large number of opinions from representative lake executives. The experiences of the present season when unusual ice conditions delayed the opening for several weeks beyond the average date, with a consequent loss in freight carried and money earned that amounted to an immense sum, has sharpened the interest in the question to an unusual degree.

The discussions center mainly about three phases of the question: The feasibility of any plan for opening navigation at the Soo waterways and at other ports, where delays from ice may be expected, at about the same time each year, say, April 15; the economy of any such plan; by whom such expense should properly be borne.

The unusual tax upon our space prevents THE MARINE REVIEW from running all discussions received up to the time of going to press, but the following will be found not only interesting but representative. Further discussions are being received and will appear in the next issue. THE MARINE REVIEW offers an opportunity to all those interested in the subject, to place their views prominently before the men most concerned.

What Russia Has Done

By William J. Wood, Naval Architect, Chicago

IT IS very clear that much loss is sustained annually by delay and the uncertainty of date of opening this narrow waterway between Whitefish Point and Detour, Mich.

The writer prepared complete construction plans of a vessel that was designed to run all winter on Lake Michigan into a port in Green bay, Wis. Masters who are familiar with the conditions in Green bay and who have tried to navigate there in winter, approved these plans and believed that such a vessel might be profitably operated in that service during the closed season. If that is the case, such a vessel could easily make its way through the route under discussion, and for the remainder of season, not lay up as suggested, but be operated in some profitable trade.

The writer was consulted by officials of the Siberian railway in 1894 in regard to a steamer for transporting passengers and freight cars, and for clearing the way for steamers to follow in her wake, across Lake Baikal, Russia. For nearly half the year the lake is frozen and that official in describing the conditions to be overcome there, stated that the ice formed strong enough to allow loaded trains to pass over it. Lake Baikal is in Siberia, government of Irkutsk, and is 397 miles long and from 13 to 54 miles wide. The area is 12,500 square miles and the depth 22 to upward of 300 fathoms. The bottom can be seen at 8 fathoms depth, the water being clear and clean. It is frozen from November until May. It was navigated by steam first in 1846, the passage across being made in eight hours. It is almost perpetually swept by wind. This lake facilitates railroad trade with China. Mongolian tribes inhabit its shores. It is situated 1,360 feet above sea level, and yields an abundance of salmon and seals on its shores in summer.

When the Russian government with foreign-built tonnage is able to keep that lake open during winter, our problem seems simple by comparison. As regards the steps to be taken to have such a vessel built and put in service and the initial cost of same, it seems to me that this is a matter that might profitably be taken up in an effort to get the government to build and put such a vessel in commission.

Practicable and Feasible

By D. Sullivan & Co., Chicago

THERE is no question in my mind but what it is practicable to use mechanical means to break the ice at the Soo river on April 15 each year, and also to keep the channels in the Soo river reasonably clear. At the same time I do not think that this would mean that navigation would be open generally and that business interests generally could so consider it.

For instance, taking this year as an example. The Soo river opened up considerably earlier than Lake Superior points, and where it is usually the key to the spring situation, this year proved that it is not always the key to the situation.

Generally speaking, I consider the proposition feasible and the matter of expense could be arrived at very readily by a meeting of the interests involved.

Should be Considered Each Year

By Herbert K. Oakes, Cleveland

THE requirements of iron ore for the furnaces vary so much from season to season that it does not seem to me to be practicable to plan any great distance ahead for the use of ice breakers to open navigation.

I think the matter is one that should be considered say along in early March each year, when we will know not only the approximate ore requirements for the season, but will also have a better line on how much ice breaking would have to be done by the ice crushers to have the channels open say by early April, if conditions in the lake trade seem to call for as early an opening as that.

In any season when conditions did call for this expense there would be no difficulty in distributing it among those who desired to have the service rendered.

Government Help Suggested

By James A. Myers & Co., Chicago

YOU ought to win the everlasting gratitude of all the vessel owners if you can succeed in breaking up the ice at the Soo, on April 1 or April 15, as it certainly has cost the vessel owners quite a sum of money, waiting until a later date. Why not have all the vessel owners assessed for the initial cost, the larger the vessel the larger assess-

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ment they should pay, and then collect a toll from each vessel going through, that also to be determined by the size of the vessel. This should take care of the upkeep expenses.

It will certainly be economical to keep ice breakers in constant service. Even the government of the United States ought to be called in to help maintain them after the government has got rid of the war expenses.

Obstacles Are Insuperable

By "Open Water"

I HAVE noted the suggestion of reducing the opening of navigation to a schedule by the employment of ice-breakers and your invitation to join in a free discussion thereof. I am disposed to think that a little further study of the problem might induce a modification of this view. First, as to forcing an opening. It should be borne in mind that the ice which causes the trouble is not formed *in situ*. Where ice fields are formed naturally by freezing, it is the experience of all, I think, that the mere breaking of a channel by boats built or suited for the purpose is no very difficult matter. Nor is there much difficulty in maintaining such channels provided the ice field does not shift. Nor will much difficulty be found by freighters in navigating such channels provided the channel is broken out to a sufficient width and the ice well broken up.

Every passage through such a channel makes each subsequent passage easier, provided again that passages are not too far apart in time and extreme temperatures do not continue too long. With fresh water at or about freezing point, as it necessarily is in the presence of extensive ice fields, especially if the current, if any, is of low velocity and little substitution of water at slightly higher temperature though of the same density occurs, a very few hours of sustained low temperature is sufficient solidly to reunite the whole mass. These features are familiar to all who have had experience with winter and early spring navigation in waters where fields are formed naturally and locally and cannot shift. Please note carefully, however, the conditions named.

How the Ice Fields Are Formed

As a matter of fact, however; the fields which cause the principal difficulty are not so formed. They are the aggregate of innumerable smaller masses formed along shore, or in quiet water under the lee of the land and later carried off shore by a shift of wind, or in the open lake, and gradually assembled by the prevailing winds towards one end of the lake or the other and anchored by windrowing and grounding, or by contracted channels and islands as in the Straits, and gradually become firmly bonded together by freezing. This mass increases in depth too by pressure due to high winds and the accretion from below due to continually lowering temperature of the water underneath as maximum density is approached, and the added weight of snow above. This last is, by the way, the feature which makes ice encountered after a winter of heavy snow so difficult to deal with because when softened by sun, rain, or moistened by being broken up, it becomes mushy on the surfaces and packs so closely either to the ship or other floes that it cannot be worked through. The most powerful ice-breaker, which can deal without difficulty with hard ice, even though heavy, will stall in such fields.

Now, this is the condition exactly which is met with in Whitefish bay, Duluth, Buffalo and the Straits. In Whitefish bay and at Buffalo the situation is aggravated by the natural current of the Soo and Niagara rivers which tends to draw the ice more and more compactly into the rivers and by the prevailing winds in the rear continually building the windrows higher and higher.

Along the outer edges of the field the floes are more or less disunited due to wave action. When a shift of wind occurs this drift is carried out perhaps, only to be hurried back by another shift and not only be piled windrow on windrow but also driven underneath, so that the field continually builds in extent and depth and explains why the fields are generally more difficult to negotiate as the lake is approached. There will always be found a fringe of varying width, perhaps several miles, along the outer edge, which is adrift due to the wave action referred to, and may be penetrated, but back of this is the solid mass of ice.

Why Channels Close So Quickly

Now, it has been observed by those who have had experience in fields of this nature, exposed over large areas to the action of winds, that tremendous lateral pressures exist, so great in fact that under the influence of long-continued gales the field formation is unable to resist the crushing effort. Hence the formation of leads or open channels which are promptly closed again with the shift of wind. Thus, even when a channel, or rather passage, has been forced, say by an ice-breaker, the lateral pressure is so great that it closes, perhaps immediately. The writer has often noted that where a passage or open lead has been thus closed the ice body at that point could not again be forced, the inertia of the whole field being so great that the thickness at that point was greatly increased, just as bar of iron may be upset by applying end pressure. This movement is well known and has been the cause of many losses of ships, even though the ship may have been at rest and making no effort to move. Your own pages carry illustrations of just such action. There are many around the lakes who will have no difficulty in recalling such instances.

Such fields cannot be forced so as to maintain a channel by any means at our command. All the ice breakers in the world could not maintain a working passage through Whitefish bay or the westerly end of Lake Superior or off Buffalo under the conditions existing there in April last.

You will not fail to note that when a passage was once forced through the lower river it was maintained with little difficulty until the fields became loosened and began to move, resulting in forcing certain ships aground out of the channel as made. This because the conditions, first referred to, obtained.

Damaging Effects on a Ship

I have heretofore considered this subject in connection with the ice itself only, but there are other considerations which are equally important. The ship herself is one, the depth of water another. As to the former, the cargo ship is not designed to encounter ice, nor in fact any other floating or submerged obstacle. Attempting to force a passage with such a vessel is folly and the master who would attempt to do so either through closed ice fields or even heavy floating or drifting ice is not well equipped for his position. Underwriters long ago paid for their experience in this respect. Ships have foundered both on the lakes and at sea as a result of contact with both free and field ice. It is true that the opening just passed, although witnessing ice conditions probably as severe as any in the history of the lake marine, was free from such disaster, but that it was so is due most probably to the lessons of the past as well as to the pressure of the underwriters.

The ship also furnishes another argument against any such proposition, namely, her propeller. While hull damage may be minimized by care it is practically impossible

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to prevent damage to the propeller if it is used at all, as of course it must be to progress ever so slowly. Propellers have been carried away indeed without movement because of the closing of gaps referred to earlier. The loss due to damaged propellers this year far outruns that to hulls and nothing that ice-breakers can do will reduce this loss; in fact it might easily be increased. While the actual money loss due to replacing propeller blades to an individual ship is not such a heavy matter the consequential losses may be, and generally are, large, as the ship is helpless and must be towed and the towbills and lost time are many times more than the actual cost of the blades themselves. A ship with a damaged, or with no propeller, is none the better for an opened channel; she is not able to take advantage of it. The light ship is particularly liable to this damage, but with such ice as has been encountered this year and particularly with the depth of water existing at some points, the loaded ship is very little better off. Any propeller thrust of any magnitude, particularly with a low rate of advance of ship, inevitably draws floes into the propeller. The action is perfectly visible and the less the depth of water under the ship the more pronounced the action.

Another thing which enters into consideration of the problem is the handling of ore. A great deal of importance is attached to the ore movement, in fact it is urged as a reason for forcing an opening, but I think if inquiry is made it will be found that in such weather as prevailed in the early weeks of the season and which was largely responsible for the delay, even if the carriers could have been got through and up to the ore docks they would not have been able to get cargoes. Frozen ore doesn't move very fast. Grain, of course, could be handled, but that is not the basis of the complaint.

It might be interesting to think about how many ice-breakers would be required to open, and keep open, channels at Whitefish, Duluth, Fort William, the Straits and Buffalo, even if the thing were possible. With my experience of such matters I do not think any of the interests mentioned, or all of them together, are likely to ever consider it seriously. It goes without saying that it would be useless to open one point of congestion if another is the only result.

Permit me to touch upon the subject of Russia and Archangel, since it was suggested. There are some of us here on the lakes who remember very well where the Russians got their idea and the gentlemen who came to represent them and where they obtained their plans (for which, by the way, they conveniently forgot to pay), and it is not necessary to suggest them to us as a model. Nixsky. But the ERMACK and sister were designed for work only in protracting open water and for breaking out cargo ships overtaken by ice in the White sea and for working about the comparatively restricted harbor at Archangel, and not for any such job as is here proposed. Moreover, the cargo ships with which they had to deal were in all cases fully loaded and to much greater draughts and had the advantage of much more deeply immersed propellers and with much greater depths of water under them, besides working in tidal waters where the fields are never permanently at rest even without regard to winds.

May Ore Shipments Prove Surprise

THE actual decrease in ore shipments from the Lake Superior district up to June 1, is 3,612,847 gross tons. This decline is in comparison with the tonnage moved last year, when the lake fleet began to hang up new records from the opening.

The total shipments of iron ore from upper lake ports up to June 1 aggregate 6,495,144 gross tons, compared with a movement of 10,107,991 gross tons up to June 1, 1916. The decline of 3,612,847 gross tons represents a decrease so far this season of 35.74 per cent from the 1916 shipments. This proportion will be cut down, of course, as the season continues.

The decline in the May, 1917, movement from that recorded in the same month last year was 25.63 per cent, an encouraging mark when the unusual delays encountered all last month are considered. The May shipments aggregated 6,283,612 gross tons against 8,449,580 gross tons in May, 1916, a decline of 2,165,968 gross tons.

Delays from ice and numerous minor causes had so seriously disarranged schedules during May that a decline of 4,000,000 tons had been expected in the ore movement.

The ore shipments by ports during May and for the season to June 1 are as follows:

Port.	—Shipments— May	To June 1
Escanaba	1,105,086	1,295,493
Marquette	98,048	98,048
Ashland	732,951	732,951
Superior	1,383,294	1,404,419
Duluth	1,765,683	1,765,683
Two Harbors	1,198,550	1,198,550
Totals	6,283,612	6,495,144
1917 decrease	2,165,968	3,612,847

Records of THE MARINE REVIEW show that receipts of ore at Lake Erie ports during May, out of a total movement of 6,283,612 gross tons, were 4,154,739 gross tons:

Port	Gross tons
Buffalo and Port Colborne	556,323
Erie	187,475
Conneaut	825,369
Ashtabula	920,605
Fairport	252,885
Cleveland	826,770
Lorain	207,828
Huron	127,405
Toledo	201,540
Detroit	48,539
Totals	4,154,739

Soo Canal Report

The total freight movement through the Soo canals up to June 1, shows a decline of 5,442,656 net tons from the tonnage moved in the corresponding period of 1916. The total movement so far this year aggregates 9,066,182 net tons, compared with 14,508,838 net tons moved to June 1, 1916. The movement during May, 1917, aggregated 8,807,892 net tons against 12,293,476 net tons in May, 1916; 7,348,567 tons in May, 1915. Of the May movement, 6,590,714 net tons passed through the American canal and 2,217,178 net tons through the Canadian canal. The eastbound movement accounted for 7,148,834 net tons and the westbound movement for 1,659,058 net tons. The detailed report of the commerce through the Soo canal up to June 1, 1917 and to June 1, 1916, follows:

	To June 1, 1916	To June 1, 1917
EAST BOUND		
Flour, barrels	902,190	876,160
Wheat, bushels	58,195,320	40,956,059
Grain bushels	19,412,738	17,558,579
Copper, net tons	13,423	12,210
Iron ore, net tons	9,019,682	5,436,467
Pig iron, net tons	8,292	.....
Lumber, M. ft. B. M.	36,047	23,524
Gen'l merchandise, net tons	24,337	12,068
Passengers, number	1,108	274
WEST BOUND		
Flour, barrels	205	.....
Grain, bushels	100	.....
Coal, hard, net tons	352,181	334,802
Coal, soft, net tons	2,581,150	1,364,435
Iron ore, net tons	.....	15,883
Mfctd. iron, net tons	36,217	15,047
Salt, barrels	179,882	119,279
Gen'l merchandise, net tons	193,013	169,675
Passengers, number	697	246
SUMMARY		
Vessel passages, No.	3,913	2,444
Regis. tonnage, net.	11,518,848	7,474,266
Freight:		
Eastbound, net tons	11,319,403	7,148,838
Westbound, net tons	3,189,435	1,917,344
Total frgt., net tons.	14,508,838	9,066,182

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In the Traffic Manager's Office

A Review of the Month on Coasts and Lakes—Useful Pointers for the Men Who Get the Business

How England Controls Her Shipping

THE regulations governing shipping which England has worked out as a result of nearly three years' war experience are particularly interesting to American ship owners and shippers at this time. The following summary, prepared by a high British authority, shows the extent of this governmental control:

"Some of the controls over British shipping instituted by the government, which have been in force during the past year, show to some degree the conditions under which our mercantile marine has been working.

"(a) Fifty to 60 per cent, embracing every type of British mercantile ship, is under requisition to the government and employed in admiralty and military service at blue book rates, which admittedly are the very essence of limitation.

"(b) All ships for the carriage of sugar cargoes and Australian wheat are put under requisition and paid for at blue book rates.

"(c) Freight limitations have been and are in force as far as practicable per British steamers.

"(d) All refrigerated ships and oil tankers are operated on government account and at fixed rates.

"(e) All regular liners, not requisitioned, are under obligation to carry a fixed proportion of cargo at fixed rates of freight.

"(f) Cargo steamers, not requisitioned, are directed to perform specific voyages and to transport specific cargoes on fixed terms and conditions.

"(g) No British vessel over 500 tons gross register can proceed on any voyage without first obtaining a license for the specific voyage intended. Here, again, control is the order of the day, because licenses are refused by the ship licensing committee—of which I am a member—unless the particular voyage is deemed to be in the best interests of the national requirements and those of our allies. Shipowners throughout the United Kingdom know only too well how licenses have been refused for legitimate trading on many occasions, and have accepted the licensing committee's decision without demur, knowing that it acted solely in the best national interests with the knowledge it possessed, and that national interests were supreme and paramount over all individual or other interests.

"(h) A certain proportion of our mercantile marine is placed at the disposal of the allies for their emergent war demands at blue book rates.

"(i) The government has taken over — arbitrarily — as emergent demands arose—absolute possession of some mercantile ships building, or at work, most suitable for its requirements regardless of shipowners' private interests, and left the latter to accept its ideas of price or arbitrate.

Why New Work Lags

"(j) Shipowners having ships building even under pre-war as well as post-war contracts have had to pay, owing to increased wages and cost of materials, substantial sums in addition to their contract prices to enable the ships and their engines to be completed. As regards these new vessels, which have no pre-war datum line of profits, they are only allowed, under the new finance act, 6 per cent profit on the capital and 4 per cent on the first cost of the ship, which is an altogether unsound and unremunerative basis, and has effectually prohibited the building or acquisition by private enterprise of further tonnage at existing inflated prices, at a time when additional British ships are an urgent necessity.

"(k) All shipping contributes to the state 60 per cent of any excess profits earned over the pre-war standard, plus 5s per £ of taxation, or, in the case of new vessels, the 6 per cent standard on capital—after allowance of 4 per cent depreciation on first cost, which has for years been the basis allowed—and as shipping revenues are derived and profits earned principally from foreign countries, all revenues to the state in the shape of taxes from British shipping constitute a material contribution to every man, woman and child throughout the United Kingdom.

"(l) Every British ship has to conform to certain regulations necessarily imposed in these abnormal times upon them, which add materially to their working cost, as well as lengthens the time on voyages, which lessens their efficiency and carrying power.

"(m) No British vessel can be sold or transferred to anyone except Britishers.

"These are some of the controls under which the shipping trade has been worked during the past year, while in December, Sir Joseph Paton Maclay, who is one of the best known shipowners, was appointed to the high and important office of shipping controller, and is now actively at work at the admiralty.

"I would take this opportunity of elucidating just exactly what 'blue book' rates of hire as paid by the government to the shipping trade are. These rates and relative terms were instituted and published in blue book form in October, 1914, based upon normal working expenses at that time by the admiralty arbitration board. I take as a fair, ordinary illustration the common ocean cargo steamship of the popular size of 7,000 tons deadweight carry capacity, familiarly known as a 'tramp'. The government rate of hire works out about 6s 6d per deadweight ton per month, out of which all the running expenses, including wages, provisions, stores, repairs, renewals and maintenance, marine insurance, protection and indemnity, management and superintendence, etc., have to be paid by the owners. The gross monthly hire of such a British tramp is about £2275, paid only so long as she is in an efficient working condition. The neutral steamer of the same class has been paid during the past year up to 45s per deadweight ton per month, employed in British trades for continuous periods of time, so that her gross monthly hire has been as high as £15,750, or close upon seven times

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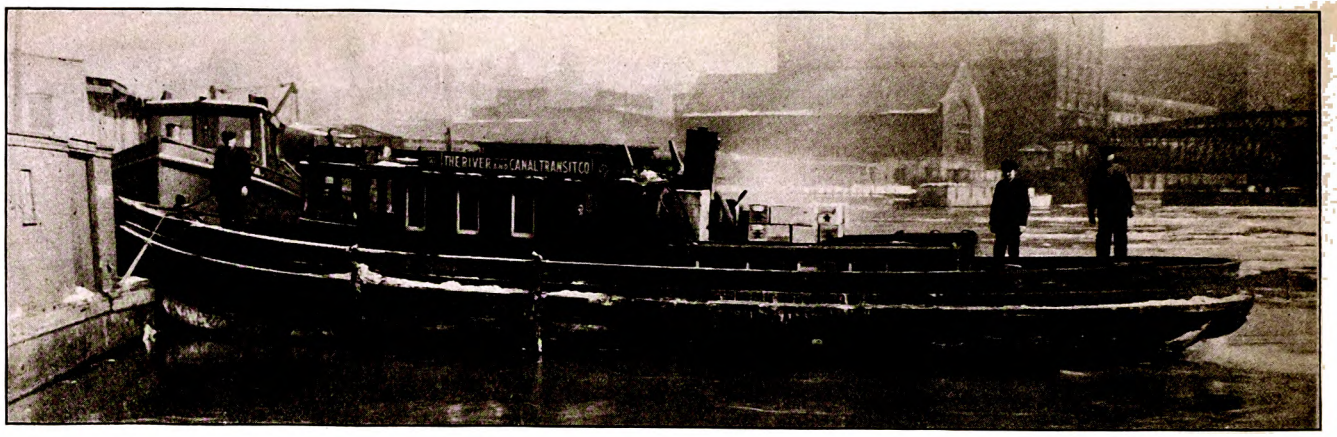


A GASOLINE TUG IS USED ON THE CHICAGO-JOLIET RUN

the monthly gross earnings of a similar requisitioned British cargo steamer.

"The material advantage to the nation afforded by the British shipowner is obvious from these figures, and is recognized and appreciated by our government, and by everybody who has any real knowledge of shipping, its attendant risks, its fluctuations, its intricacies and its adventurous uncertainties.

"Since these blue book rates were instituted working expenses in every single item have increased enormously, and continue to do so, but since March 1, 1915, when a small increase was granted to ocean tramps, which is included in the rate of hire before cited, no increase in rates of hire has been granted to meet the increased working costs, which are materially heavier than at that date.

"That is the position as regards requisitioned British tonnage and blue book rates, and illustrates how shipping property has been dealt with by the government, and what the shipowners have done and are doing, in the national interests during this great war."

Capt. B. T. Eastaway, for many years in employ of the Allan line between Boston and Glasgow, was killed recently.

Carrying Freight by River and Canal

One of the economic lessons which the war has begun to teach is the value of utilizing the inland water routes for freight transportation. The part which New York's rebuilt barge canal can play this year in carrying grain to the seaboard is being studied seriously. The congestion of traffic on the railroads all over the country has directed renewed attention to the country's other inland rivers and canals.

Some months before the war broke out, but while the traffic situation was becoming more serious, the River & Canal Transit Co., Chicago, purchased a gasoline tug and a 75-ton barge and began to carry package freight from Chicago to Joliet, Ill., by way of the Chicago river, the drainage canal and the Desplaines river. The tug and barge are shown in the accompanying illustrations. The Chicago dock is at the foot of Orleans street, close to the wholesale district and conveniently located for shippers.

A round trip from Chicago to Joliet is made each night, about 5 hours being required to cover the 40 miles between the two cities. This allows time for discharging and loading cargoes.

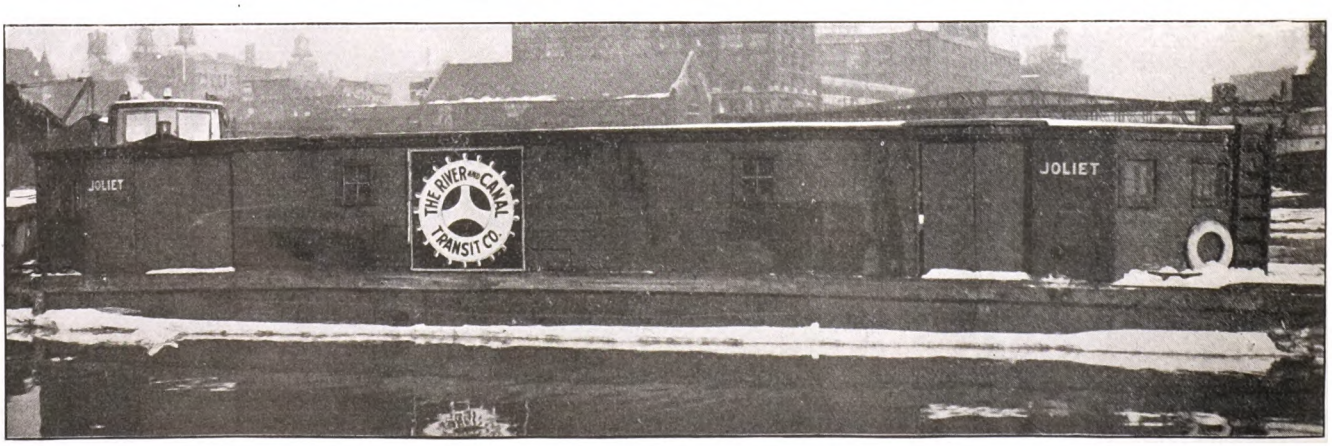
To enlarge the field of the water line, a joint traffic arrangement has been made with the Chicago, Ottawa & Peoria railway, an electric interurban line 85.36 miles long, serving 16 towns in the Illinois river valley.

The rates are the same as those made by the railroads and the company operates under the regulations of the Illinois public utilities commission. The Illinois freight classification governs.

An express service is also maintained with pick-up and delivery at rates somewhat under those of companies operating on railroads.

The Transit company has been carrying freight since November and is building up business steadily, as the service is appreciated for its speed and dependability. During the winter season no delays of consequence were encountered on account of ice as the current in the river and canal prevents thick ice forming sufficiently to close navigation.

With an increase in patronage, the Transit company plans to add another barge and enlarge its service. It has been hauling a wide variety of freight, from groceries to iron and steel products and shippers find it a time saver from many points of view. On shipments of 6000 pounds or over the barge loads direct from any dock in the Chicago river without added charge, saving the shipper the cost of cartage.



THIS BARGE WAS EMPLOYED ALL DURING THE WINTER

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Will Direct Ore and Coal Trades

Clearing Houses Formed By Lake Interests to Insure Maximum Efficiency of Vessels and of Ore and Coal Carrying Railroads—How Plans Are Being Carried Out

THE men charged with the task of moving the immense tonnage of iron ore and coal which the industries in the territory tributary to the Great Lakes will require in the next 11 months, are attacking the problem in a way that seems sure to win success. Through central clearing houses, means are being found to minimize delays and thus to obtain the maximum efficiency from the vessels and railroads which serve the Great Lakes trade. This movement, which at first embraced only the coal trade, has been extended to include the iron ore traffic. The men actively interested in the plans are confident that at least 5,000,000 tons more of iron ore and coal will be moved this season than would have been possible without the assistance of these clearing houses.

The plan was first taken up in May when a committee of shippers and vessel owners, working in conjunction with Francis S. Peabody, chairman of the committee on coal production of the council of national defense, took the preliminary steps in organizing what has since become known as the Lake Erie Bituminous Coal Exchange. The lake committee included George D. Cameron of Pickands, Mather & Co., William Collins of M. A. Hanna & Co., H. P. McCue of the Pittsburgh Coal Co., E. A. Uhrig of the Milwaukee-Western Fuel Co., and R. F. MacVeigh of the Island Creek Coal Co. When the shippers' committee took up the subject with the representatives of the coal-carrying railroads, the latter adopted the plan without hesitation. F. C. Baird, Pittsburgh, freight traffic manager of the Bessemer & Lake Erie railroad was appointed commissioner and placed in charge of handling the coal movement at Lake Erie ports between Erie and Toledo. Mr. Baird opened offices at Cleveland and since June 1 he has been actively directing the coal movement on the lakes.

How the Coal Plan Works

Under normal conditions, each individual shipper has been sending his coal to a Lake Erie port where he would gradually accumulate enough for a complete shipload. As a result, the cars were tied up and, owing to the numerous grades of coal handled, much switching was necessary. Under the new arrangement, coal owned by different producers is handled through the central clearing house and is dispatched up the lakes as quickly as the steamers are available. This plan, of course, greatly reduces the number of grades of coal handled and enables the coal-carrying railroads to obtain the greatest possible amount of service out of their cars. The saving which the plan will effect in the time that freight cars are held is estimated to be equivalent to adding 52,000 cars to the freight equipment. In a general way, it is estimated that the plan now being worked effects a saving of 1½ days in the time each car carrying coal to a Lake Erie port is held in that port.

Ship Only Ore Required

The plan for a central clearing house for handling the coal trade was only fairly under way when similar measures were taken in regard to the iron ore traffic. A meeting of the Lake Superior Iron Ore association was held in Cleveland on May 24 upon the suggestion of C. D. Dyer, of the Shenango Furnace Co., Pittsburgh, chairman of the lake shippers' committee. As a result of the meeting, the association decided to ask consumers of Lake Superior iron ore in all sections of the country to make out reports showing: The amount of ore necessary to meet actual requirements from May 1, 1917, to June 1, 1918; the amount of ore held at furnaces or on docks on May 1, 1917; the amount of ore to be shipped by lake in 1917; the tonnage of ore to be shipped by rail and the amount to be stored on Lake Erie docks.

In the meantime, the committee on iron ore, pig iron and lake transportation of the American Iron and Steel institute, headed by H. G. Dalton, chairman, and including Frank B. Richards, Harry Coulby, C. D. Dyer, W. T. Shepard, G. H. Woodward, Leonard Peckitt, Frank Billings and Amasa S. Mather, has worked out a plan for handling the ore movement through a central clearing house. Messrs. Dalton and Coulby were elected as a subcommittee on the lake ore movement and were directed to appoint three other members. These members are E. W. Oglebay, Frank Billings and Matthew Andrews.

This committee has drawn up a plan for a clearing house committee. At a meeting held in the office of Mr. Coulby, chairman of the subcommittee, representatives were present from the different ore offices who had particular charge of handling ore. Those present agreed that a plan of a clearing house committee, of which each one of them should be a member, was one which would do much to relieve the ore situation. It was decided that this committee should hold regular meetings daily or oftener, if necessary, to clear their ships. Each man would bring in a list of the ships that he was loading or had enroute for shipment to furnaces, giving the date that his ship would be down to unload and the disposition of the ore. "By planning ahead and exchanging information," says Mr. Coulby in a report, "this would obviate a number of shippers loading ore for any one consignee on the same day and would make a more even distribution of the shipments of ore among the different consignees. It would prevent bunching of boats at any one dock for direct shipment to one consignee and to facilitate the movement, they would, no doubt, at times find it necessary to exchange boat tonnage with each other in cases where boats got bunched and possibly at times load their ships with split cargoes of ore. It was also thought necessary that there should be a man on this clearing house committee who was thoroughly posted on the railroad situation and who would have charge of keeping the committee advised at all times of the car supply and the unloading of ore at all the furnaces each day, as well as the amount of ore that was enroute."

56,000,000 Tons Needed

At a meeting which was held June 12 it was decided that Mr. Baird should be given this place on the clearing house committtee.

The long delay in opening the season caused by the heavy ice encountered during April and May, makes the need for such direction more imperative. It is the general opinion around the lakes that a movement of 55,000,000 to 56,000,000 tons of iron ore will be sufficient to supply blast furnaces until June 1, 1918. Last year the lake fleet moved 64,734,198 gross tons. Up to June 1, this year, the movement is only 3,612,847 gross tons behind last year's record. The May movement, as shown in the table on page 242, proved a surprise and with the season now in full swing, the fleet is expected to be able to approximate closely last year's record.

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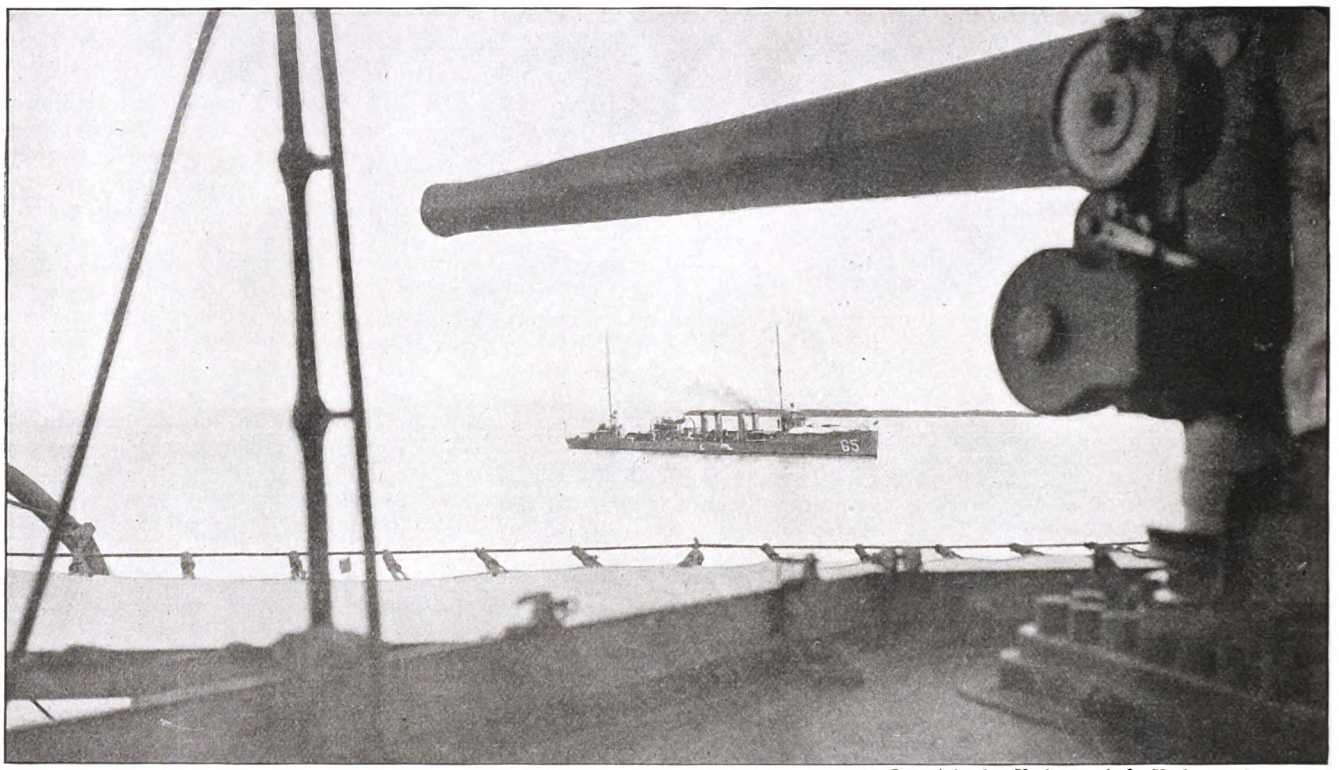
Latest Marine News in Pictures

Payment Will Be Made For Acceptable Photographs



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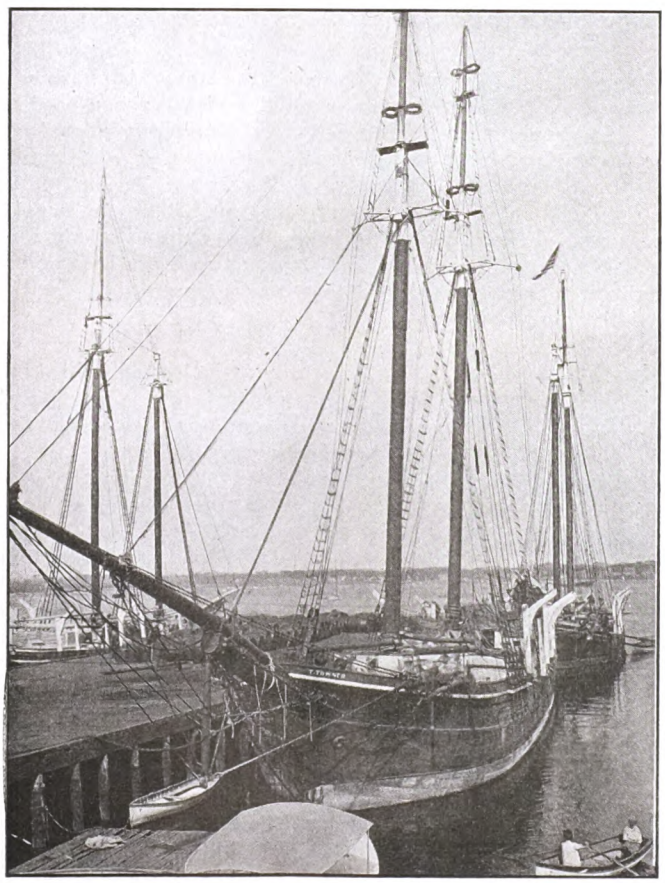
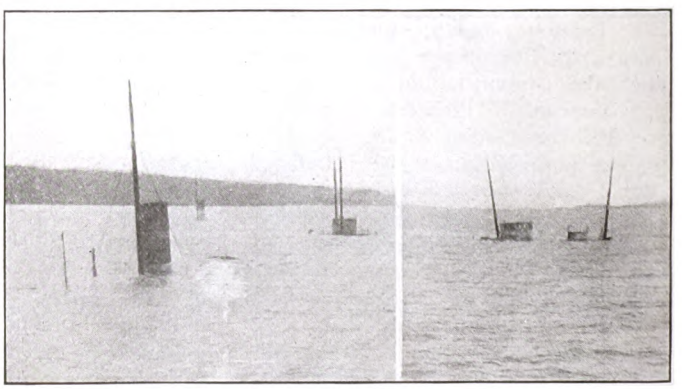
CO-OPERATION AS PRACTICED IN THE NAVY—THE BIG BATTLESHIP'S GUN IS "STANDING BACK" OF THE DESTROYER, WHICH IS ALERT TO PROTECT HER BIG BROTHER



WHALERS AT NEW BEDFORD—A SCENE THAT BRINGS BACK OLD MEMORIES



FIRST SERIOUS LAKE ACCIDENT IN 1917—SAXONA AND MITCHELL SINK IN ST. MARY'S RIVER

ONLY VOLUNTEERS BUT NOT AFRAID TO DRILL

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Photographs From Far and Near

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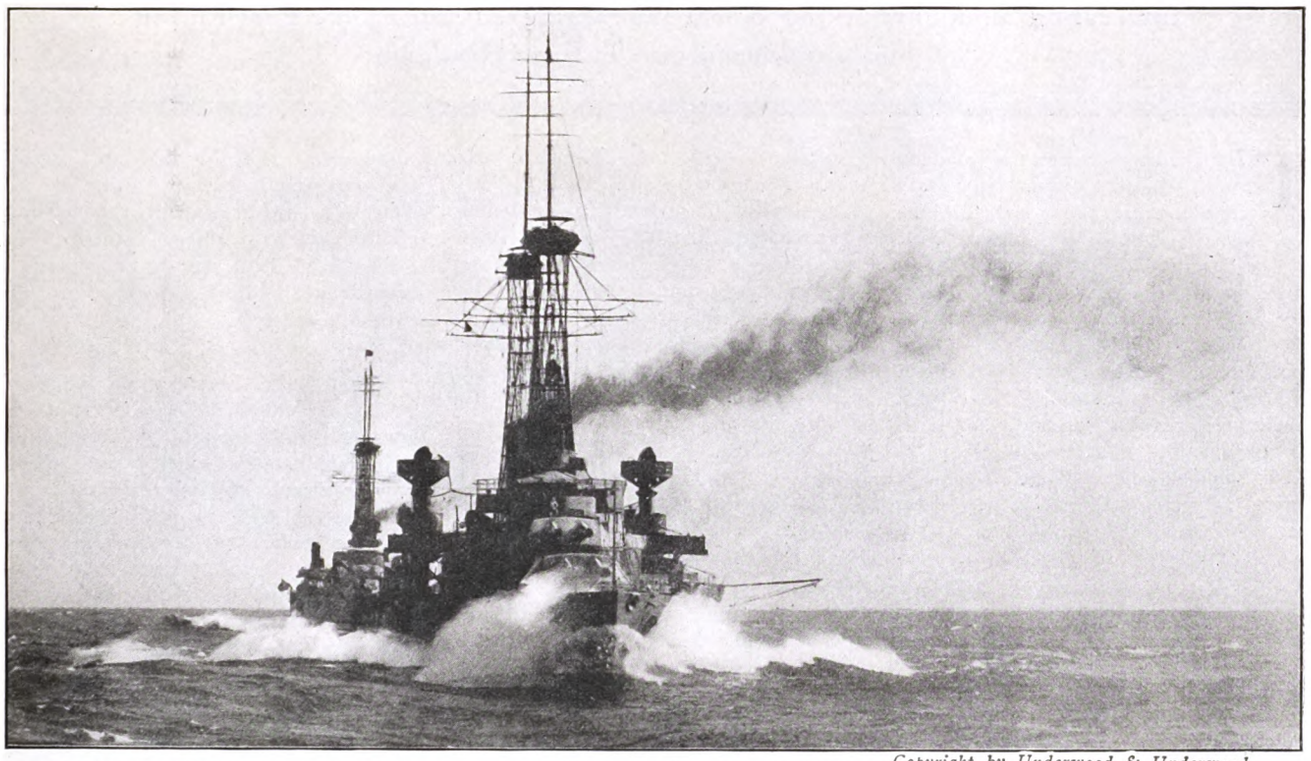

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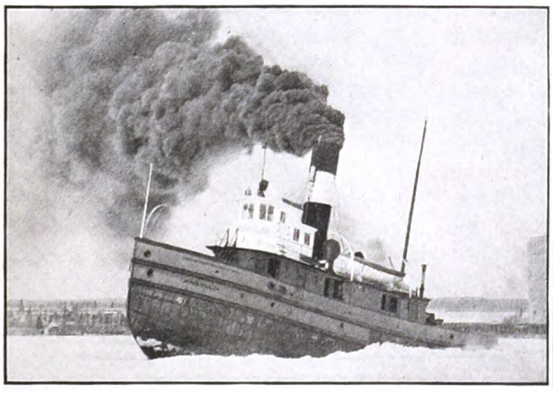
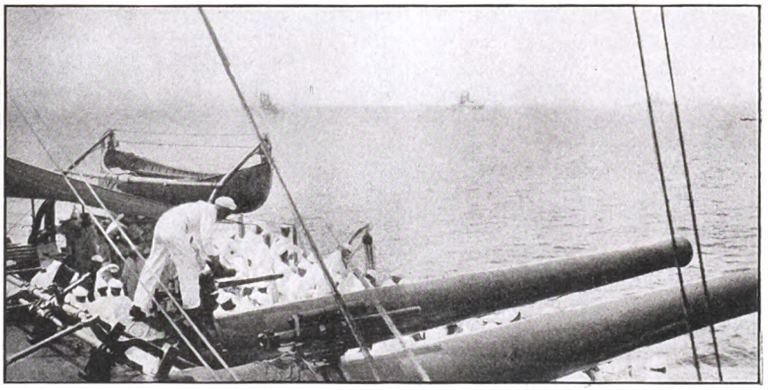
SUPERDREADNOUGHT NEW YORK LEADING HER DIVISION—A SIGHT DESIGNED TO AROUSE FEAR OR PRIDE ACCORDING TO THE NATIONALITY OF THE ONLOOKER



TUG JAMES WHALEN BREAKING 43-INCH ICE AT PORT ARTHUR—3¼ MILES IN 18 HOURS



A SCENE ON BATTLESHIP LOUISIANA—THE GUNS ARE OF THE 12-INCH TYPE

VOLUNTEERS LEARNING THE SECRETS OF KEEPING A BATTLESHIP—AND HER CREW—CLEAN

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Marine News of the War

Interesting Sidelights on the World War Gathered During the Past Month and Condensed for the Busy Reader

THE United States is sharing with Russia, France and Italy the use of the repaired German vessels, which were taken over in April. The United States shipping board announces that two of the former German vessels have been leased out to each of these three foreign governments, under what is known as "trip time charters". The first of the merchantmen was ready for service on June 10.

The shipping board has issued the following formal statement in regard to the repair and outfitting of the vessels, which have been taken over or purchased since the outbreak of the war.

"The work of repairing and making ready for sea the interned German and Austrian vessels is progressing in an entirely satisfactory way.

"The MAIA and ARMENIA have been made ready for sea and have been allotted to the French government; the PORTONIA and the NASSOVIA to the Russions; the CLARA MENNING and PISA to the Italians. The OCKENFELS is ready, practically, but has not yet been definitely allotted. These vessels are assigned to the governments mentioned on what is known as 'trip time charters.'

"The following sailing vessels which were on the Pacific coast have been given all necessary repairs, and have been chartered and are in useful service: ARNOLDUS VINNEN, 1859 gross tons; KURT, 3109 tons.; STEINBEK, 2164 tons; DALBEK, 2723 tons; OTTAWA, 2659 tons.

"The STAATSEKRETAR KRAETKE, of 2009 tons, steamer, and the GOVERNOR JAESCHKE, of 1738 tons, steamer, will be repaired sufficiently at Honolulu to come to the west coast under their own steam. The ELSASS, which was interned at Pago Pago, was towed to Honolulu by a navy tug, and will receive repairs there. Several others have been brought to the Pacific coast, and are now being repaired.

"Progress on the vessels is being made, and the present month will see considerable tonnage placed in commission. According to our estimates, the following vessels will be ready on the dates mentioned: The PISA, 4964 tons, is ready, and has been assigned. The OCKENFELS is practically ready. She is a vessel of 5621 gross tone. The following are due for commission June 10: DORA (Austrian), 7037 tons gross, IDA (Austrian) 4730 tons, HARBURG 4472 tons, MAGDEBURG 4497 tons, PRINZ OSKAR, 6026 tons, RHAETIA 6600 tons. The ADAMSTURM, 5000 gross tons, is expected to be ready June 15, and the ARCADIA, 5454 tons, on June 20.

"The work will go along steadily, and in July there will be another considerable addition to usable tonnage, estimated as follows: ALLEMANNIA, 4630 gross tons, and the ERNY (Austrian), 6515 tons, July 1, as well as the large PENNSYLVANIA, 13,333 tons, and also the WILLEHAD, 4761 tons, and the SERAPIS, 4756 tons. The LUCIA, 6744 tons, is due July 10; CLARA, 3932 tons, July 12; the ANNA, 1576 tons, and PRINZ JOACHIM, 4760 tons, July 22, and the BOHEMIA, of 8414 tons, July 30.

"In the case of the vessels already referred to as having been assigned to the various governments, the repairs were in the main completed ahead of estimated time, and it is fair to suppose that the above estimated schedule will be complied with, and in some instances gotten ahead of."

* * *

About 12 of the largest American passenger ships have been requisitioned by the army and navy for specific war duties. These vessels have been contributed by the Southern Pacific, the New York & Cuba Mail, the Clyde Line, the Mallory line and the United Fruit Co. Over and above these boats an agreement has been arrived at between the government and the coastwise lines for chartering several of their larger steamers for transatlantic service. Ten or twelve steamers are about to be utilized in this way for the carrying of supplies to allied countries. The lines which are contributing these freight vessels are the Southern Pacific, the Porto Rico line, the Clyde line, the Munson Steamship line and the Bull line.

* * *

The joint resolution adopted by congress, authorizing the President to put into service vessels of the enemy in American ports gave legal sanction to the plan of utilizing the 96 war-bound German boats for government service. After the war, Germany is expected to claim that the United States violated the treaty of 1828 in taking over the vessels, but state department officials believe there is no valid ground for such complaint. The resolution applies to German merchant craft in all American waters except the harbors of the newly acquired Danish West Indies or Virgin islands, excepted in accordance with a provision of the purchase treaty.

* * *

Simon Lake, inventor of the even keel type submarine, reports that he has perfected plans for building merchant submarines which would measure between 5000 and 10,000 tons. He asserted that the designs had been under consideration for several years, but that until the present war situation there had been no demand for such submarines. More than 100 of the proposed submarines, according to Mr. Lake, will be constructed the first year. During the second year he estimates that 500 could be launched with the co-operation of the government. He has organized the Merchant Submarine Co., capitalized at $10,000,000, and chartered in Maine. The vessels would be more than 10 times larger than the DEUTSCHLAND, the German merchant submarine which crossed the Atlantic.

* * *

One of the foremost authorities on shipbuilding in the world, a man who helped build many of the German liners now under the American flag, does not look with favor upon the proposal of the United States to build wooden ships to make up for the losses through the submarine warfare. He is Alexander Carlisle, late general manager of the shipbuilding firm of Harland & Wolff, Belfast, Ireland. The reason he advances is that wooden shipbuilding is a lost art

"The American oak," said Mr. Carlisle, "which is available for shipbuilding at the present time is better adapted for coffins than ships. The oak used in the wooden ships of the past came from France, and can no longer be obtained. It was light and lent itself to the framing of the bilges and the fore and aft bodies.

"Also, there is required a greater manual effort to build wooden ships than ships of steel or iron, and there are no men in Great Britain now skilled in building ships of wood; it is a lost art."

From his close knowledge of the ex-German liners, taken over by the United

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States, Mr. Carlisle does not believe they could be used as food carriers without extensive alterations. "I assisted in building some of the largest of them prior to 1910, so that I have personal knowledge of their capacity and possibilities. The majority are essentially passenger ships and not carriers, and demand vast stores of coal and an immense personnel for navigation from one side of the Atlantic to the other. They cannot be rendered torpedo-proof, and are even more likely to be sunk than the smaller ships which sail the sea. As transports for troops they would no doubt, have their uses, owing to their great accommodation for passengers, but as food carriers they would require very drastic conversion, which would probably prove more or less unsatisfactory when carried out."

* * *

Norway has prohibited the sale abroad of all Norwegian vessels which are not yet officially registered. The sale of Norwegian vessels which are registered has already been prohibited.

* * *

Sir L. Money, parliamentary secretary to the British shipping controller, replying recently to a question as to the building of standardized ships, said: "The program of standardized cargo shipbuilding which is being carried out is designed, under expert advice, to produce for the national use, in the shortest possible space of time in the given circumstances, vessels specially designed to meet the conditions of war, and it is not the case that these standard ships have been substituted for vessels which are equally suitable. The standard program is not one of disorganization; on the contrary, it is a method of organization which economizes time, material and labor."

* * *

Secretary Redfield notified congress on June 2 that on May 1 there were under construction in the United States 537 steel vessels with a tonnage of 2,039,000 and 167 wooden vessels, aggregating 214,700 tons. The figures are nearly double those of a year ago.

* * *

Owing to the increase in government war risk insurance work, William C. DeLanoy, director of the bureau of war risk insurance, has found it necessary to increase his staff. Prior to the first of this year Mr. DeLanoy's bureau consisted of himself, one assistant, four clerks and a messenger. Now he has two assistants, a superintendent of office details, 22 clerks and two messengers. This increase in staff has been necessitated by the growth in the war risk insurance work since the United States became a belligerent nation. The amended war risk bill passed by congress, which permits the insurance by the bureau of the lives and limbs of masters, officers and seamen, will cause this office force to be further increased. The new work, it is estimated, will probably make it necessary to double the present clerical staff.

Premiums in January were only $175,000. The business done by the bureau has been increasing by leaps and bounds each month since then until in April the premiums amounted to $2,750,000. During April the bureau wrote 1074 policies, which carried premiums exceeding a total of $2,772,000. During the first half of May the bureau wrote more than 600 policies, the premiums on which totaled approximately $1,775,000. At the present rate of increase it is anticipated that the business of the bureau during the current month will equal the total amount of business done by the bureau from the time it was established in 1914 until the first of the present calendar year. This increase in business is due entirely to the insurance of hulls and cargoes of American vessels. The total losses to date, insured on cargoes and hulls, amounts to approximately $6,000,000.

* * *

As a member of the executive committee of the chamber of commerce of the United States, Homer L. Ferguson, president of the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., has been actively engaged in assisting the chamber in its program for enabling business men to assist the government most effectively in all necessary war measures.

* * *

Secretary of the Navy Daniels has announced that the names of the seized German ships that have been assigned to the navy have been changed as follows:

GEIER to SCHURZ, BRESLAU to BRIDGEPORT, KIEL to CAMDEN, LEIBENFELS to HOUSTON, SAXONIA to SAVANNAH, VOGENSEN to QUINCY, NICARIA to PENSACOLA, ODENWALD to NEWPORT NEWS, HOHENFELDE to LONG BEACH, FRIEDA LEONHARDT to ASTORIA, ANDROMEDA to BATH, RUDOLF BLUMBERG to BEAUFORT, PRESIDENT to KITTERY, LOCKSUN to GULFPORT. The GEIER, the German gunboat which was interned at Honolulu and taken over by the United States after the declaration of war, is renamed for Carl Schurz, the famous German-American soldier and statesman.

* * *

More vessels cleared for foreign ports from New York in May than in any previous month this year, says *The New York Times*. The net tonnage also made a record for this year. Statistics show that 428 vessels, representing a net tonnage of 1,155,508, left in May, compared with 383 vessels and 1,043,466 tons in April. Clearances from New York the earlier months of this year were: March, 396 vessels, 1,081,028 tons; February, 393 vessels, 911,748 tons; and January, 393 vessels, 1,098,986 tons.

* * *

The seven Austrian merchantmen held in American ports, totaling 52,621 tons, were purchased recently by the United States shipping board, for $6,778,006. The price is about half the prevailing price for ships. The vessels will be repaired within a few months and placed in the war emergency trade. The ships are: DORA, 7037 gross tons, at New York; IDA, 4730 tons, at New York; ERNY, 6515 tons, at Boston; ANNA, 1575 tons; CARA, 3932 tons; TERESA, 3769 tons, at New Orleans; LUCIA, 6744 tons, at Pensacola. They were bought from A. T. Herd and George A. Carden, New York shipowners, who agreed to sacrifice their profits and sell at virtually the same price they gave for the vessels.

* * *

Sixty of the 76 German merchant steamers which were in Portugese ports when Portugal entered the war and which were promptly seized by the government, have been turned over to Great Britain on a rental basis. England has rented the ships for $7,000,000 a year, to be paid after the war. What will become of the ships after the war, whether they will become the permanent property of Portugal or England, or go back to Germany, is much in doubt.

* * *

The American steamship DEKALB, formerly the German auxiliary cruiser and commerce raider PRINZ EITEL FRIEDRICH, has been placed in full commission in the American navy. The DEKALB was the first of the German ships, either naval or merchant, to be employed against the German government.

* * *

An example of the earnings of steamships in ocean service under war conditions is found in the recent voyage of the steam schooner DAVID EVANS from Portland, Ore., around the world via Cape of Good Hope in eight months. She was chartered by Balfour, Guthrie & Co., from Portland to Cape Town with lumber for $75,000. From Cape Town she went to Manila in ballast and from thence across the Pacific with copra for $60,000, her total earnings for the round voyage being $135,000. Her running expenses were about $48,000.

* * *

EDWARD LUCKENBACH of the Luckenbach Co., Inc., New York, arrived in Hobart, Tasmania, recently from New York via the Panama canal and New Zealand ports, the first American steamer to call at Hobart in 20 years.

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American Ship Yard Activities

A Snappy Summary of the Leading Events of the Month in the Vessel Construction Field

Millions Being Spent on Navy Yards

TREMENDOUS building of navy yard extensions, training stations, submarine bases, storage warehouses for navy use, etc., is being carried forward at top speed. The immensity of the navy program of upbuilding can be gathered from the size of proposed expenditures, $80,000,000. This work is being done under the direction of the bureau of yards and docks, of which Rear Admiral F. R. Harris is chief, assisted by a corps of civil engineers of the navy, a special staff corps trained in this work. Under them is a large force of trained civilian engineers, designers, inspectors and experts.

Practically Rebuilding Yards

"The improvement program," Admiral Harris said recently, "amounts to the practical rebuilding of some of our navy yards and stations. This undertaking which is well under way, and in some cases nearing completion, provides building ways, shops, tools, cranes and all of the requisite appurtenances for building destroyers, submarines, scout cruisers, gunboats and auxiliaries. Besides this, by indirect supervision and assistance the warship building facilities of the large private plants have been increased, in some cases such assistance extending to the enlargement of shops and an increase in production facilities at some of the large electric, steel and ordnance plants of the country.

"Remodeling and enlargement of all the power plants at the stations are well in hand and in nearly all cases under contract, and arrangements made for carrying out the plans long ago perfected so as to 'tie in' these various important government plants with industrial sources of power in their vicinity.

"As an example of the scope of the work more than $10,000,000 is involved in providing immediately storage space for provisions, supplies and ammunition. In many cases such storage will be permanent and at the New York navy yard, for instance, we are building a storehouse which will be the largest single building of the kind in the United States. This is now under way and will be completed within five months. This storage program for supplies and munitions involves the construction of magazines, shell-houses, torpedo storage, mine storage, nitrate storage, in all requiring over 200 buildings.

World's Biggest Gun Shop

"The shore work of the navy under way involves the building of the largest and heaviest gun shop in the world and of shops for the complete production of torpedoes, mines and optical instruments, besides projectiles and powder.

"The shipbuilding facilities under way contemplate provision for the construction of the largest warships ever built. This involves the provision of structural shops, machine shops and foundries of the most modern type, some of them heretofore unprecedented in size. The machinery for these buildings is most unusual in character. The crane service is a large step in advance of anything heretofore contemplated. Traveling cranes having a capacity as high as 300 tons are being built, while fitting out cranes with a capacity of nearly 400 tons are planned. The largest cranes of such character ever before built, and these for England and Germany, are only 300 tons.

"The program includes the construction of two dry docks capable of taking the very largest vessels. Both of these are well under way. Arrangements have been perfected for expediting their construction so that it is hoped they may be completed and ready for use in about one-quarter of the time that has heretofore been taken for the construction of smaller docks.

Activities are Varied

"Training and concentration camps for nearly 50,000 naval militia and reservists are being provided and will all be completed by the first of July, small villages in themselves containing several hundred buildings, with lighting, heating, plumbing and draining, undertaken and finished in the brief space of one month.

"For the purpose of communication new radio stations have been built along the coast all the way to Alaska and also in our island possessions.

"Fuel storage depots for the storage of oil, so essential to the fleet, have been planned and in many cases are under construction.

"Supply depots, magazines, gun shops, powder and projectile plants, barracks, training schools and camps, marine corps depots, fuel stations for coal and oil, rifle ranges for target practice, hospital pavilions and medical supply stations are among the large variety of new buildings provided.

"Long before the break with Germany, the navy department had taken steps looking to the practical rebuilding on a large scale through a period of years of three of the most important Atlantic coast navy yards and a natural expansion and development of the other yards and stations. The declaration of a state of war changed this condition and required that all this improvement, and more than had been originally planned, should be put

Women in Shipyards

F. Kellaway, a member of the British parliament and parliamentary secretary of the ministry of munitions, recently stated that he did not think he exaggereted in saying that but for the work that women had done in the munition shops of Great Britain the Germans by now would have won the war. Women were doing important work in marine-engine building, including turning and connecting rods, propeller shaft liners, and most of the drilling. So wide was the scope of women's labor that a prominent British engineer expressed his firm conviction that given two more years of war, he would undertake to build a battleship from keel to aerial in all its complex detail entirely by women's labor.

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under way and completed within the shortest possible time, and further required the establishment of coastal stations, aviation stations, submarine bases and training camps not previously planned."

Some idea of the construction work being done by the navy department can be gained by the mention of some of the many improvements now under way:

New York navy yard.—About $5,000,000 being expended on new ways for building the largest ships; the largest storage warehouses in the country; doubling machine shops; erecting new structural shops, and other shops and buildings.

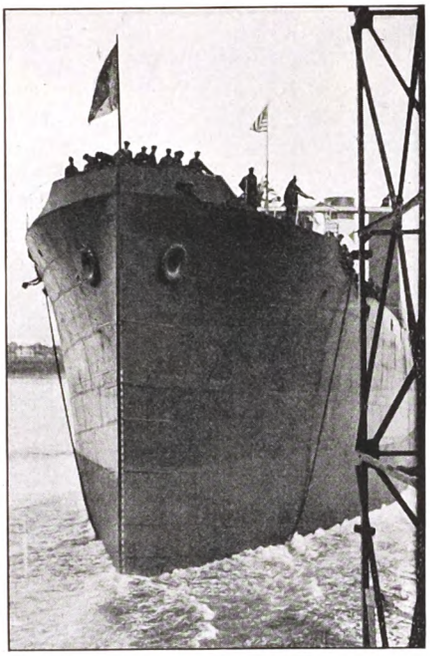
Philadelphia, League Island.—New drydock 1000 feet long, which will be able to accommodate the largest ships; two new ways for shipbuilding; new structural and machine shops, pattern shop and the largest foundry on the Atlantic coast; barrack for marine corps; other auxiliary buildings. The total expenditure involved will be about $18,000,000.

Norfolk navy yard.—Drydock 1000 feet long capable of accommodating the largest ships; new structural and machine shops and foundry, waterfront and other improvements, including barracks and other buildings, involving a total expenditure of nearly $20,000,000.

Washington. — Naval gun factory being expanded into one of the largest plants of the kind. Total expenditures about $7,000,000. New gun shop being erected which will cost about $2,000,000.

Mare Island, Cal.—Navy yard being equipped to build the largest type of battleships. Camp for 5000 men being erected.

Puget Sound, Wash.—Three million dollars being expended in facilities for building cruisers and various types of auxiliary vessels. Various improvements have been made at the navy yards at Portsmouth, N. H., at Newport, R. I., Boston, New Orleans and other points. Hundreds of magazines, storehouses, barracks, hospital pavilions and medical storage houses have been erected or are under construction in the various naval districts. Work is going steadily forward on the big base at Pearl Harbor, Hawaii and on the 1000-foot drydock there.



LAUNCHING ARGENTINE TANKER AT QUINCY

New Argentine Tanker

INGENIERO LUIS A. HUERGO is the latest of a number of vessels constructed at the yards of the Fore River Ship Building Corporation, Quincy, Mass., for the Argentine republic. She is a bulk oil carrier, is 344 feet over all and will carry a deadweight of close to 4600 tons.

In general appearance INGENIERO LUIS A. HUERGO conforms to the typical bulk-oil tanker design, having a poop, bridge and forecastle, two pole masts, one smokestack, with machinery located in the stern. Accommodations have been arranged under the forecastle deck for a hospital, carpenter shop, lamp room, paint room and stores. Under the bridge deck are located the cabins for the navigating officers and wireless operator, together with a large dining salon.

In the pump room are powerful pumps for transferring the oil cargo either from ship to shore or shore to ship. Forward of the pump room are 12 oil tanks, six on each side of an oil-tight centerline bulkhead—these tanks having a stowage capacity for 1,370,000 gallons of oil. Separating the forward cargo oil tanks from the cargo hold is a cofferdam 4 inches wide, so as to prevent any damage to the cargo from oil leaking through from the adjacent tanks.

The propelling machinery consists of a single, vertical, inverted, triple-expansion engine designed to drive a 4-blade propeller. Steam is furnished by two single-ended Scotch boilers arranged to burn fuel oil.

Builds Oil Carrier

The ninth tank steamer built by the New York Ship Building Corporation, Camden, N. J., for the Gulf Refining Co., was delivered recently. She is GULFMAID, and is the fifth of her type. She is to be followed by one other, GULFLAND, of the same dimensions. The ship building corporation has constructed 14 oil tank steamers since its establishment at the end of the last century; eight more are now being built.

Each vessel of the GULFMAID class has

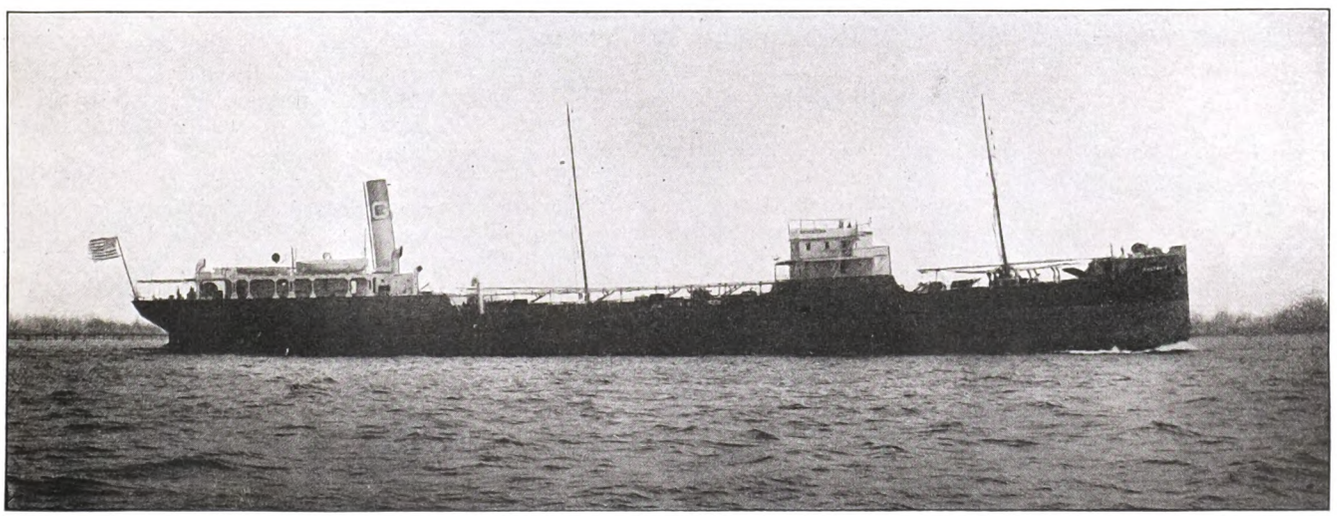


Photo by New York Ship Building Co.

OIL TANK STEAMER GULFMAID ON HER TRIAL TRIP

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a carrying capacity of 2,320,000 gallons of oil in 16 main and six wing tanks. The propelling machinery is aft. Quarters are provided both amidships and aft for the officers and crew.

The vessels are of more than average speed, being good for 11½ knots at sea. The overall dimensions are 406 feet 7 inches by 51 feet 3 inches beam by 30 feet 2 inches depth. They are framed on the Isherwood system of longitudinal framing. The three Scotch single-end boilers are oil fired, arrangements being provided for converting to coal if necessary or desirable. The vessels are fitted with wireless equipment. As evidence of the general seaworthiness of these ships, it is interesting to recall that GULFLIGHT survived a mine explosion early in the war.

Sufficient pumping units are supplied to enable several grades of oil to be handled at the same time.

The Cumberland Shipbuilding Co., Portland, Me., capital $500,000, has been incorporated by F. H. Irvin, E. V. Mann, M. F. Day, F. B. Rowe, M. D. Griffin, all of Portland.

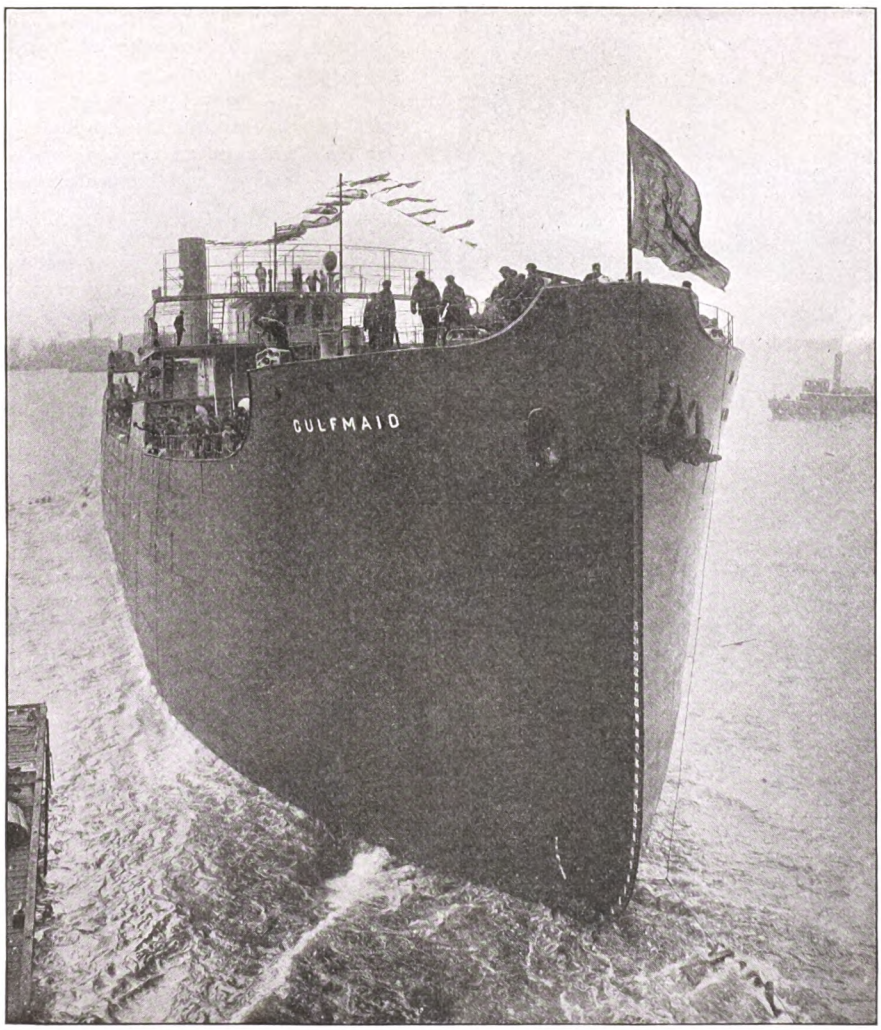

Photo by New York Ship Building Co.

GULFMAID'S FIRST DIP

New Craig Plant

John Craig 2nd, James G. Craig, Thomas R. Merrill, Lloyd Swayne and Charles H. Cummings Jr. have been elected directors of the recently organized Craig Shipbuilding Co., Long Beach, Cal. The directors elected the following officers: James G. Craig, president and treasurer; John Craig 2nd, vice president; secretary and purchasing agent; Thomas R. Merrill, general manager; Lloyd Swayne, mechanical engineer; A. E. Hudson, naval architect, and Charles H. Cummings Jr., superintendent of construction. They have been filling these positions during the construction of the plant which has now progressed so far that the construction of the first vessel has been started.

James G. Craig, president, and John Craig 2nd, vice president, are sons of J. F. Craig, well known on the Great Lakes and in the shipbuilding industry of southern California.

At the present time the Craig Shipbuilding Co. starts out with a contract for one steamer for the Pacific Transport Co., to carry 3000 tons deadweight and to cost $450,000 and to be delivered in eight months. The company has a contract with the Western Transport Co. for a duplicate of this steamer, to be delivered in 12 months. About 150 men are now employed in completing the plant and in starting the construction of the first ship.

New Southern Yards

The Star Shipyard of New Orleans, has been incorporated to construct a $250,000 yard for building wooden ships. It will install a complete shop equipment, including electric-driven cranes and pneumatic machinery. On the company's initial contracts for six wooden hulls of 3500 tons cargo capacity each, 3000 men will be employed. Another important southern company is the National Shipbuilding Corp., Orange, Tex., which has been organized to construct a plant including seven ways for building wooden ships and tank steamers, 1000 men to be employed. A $50,000 enterprise is the Gulfport (Miss.) Shipbuilding Co., chartered to construct vessels. The American Shipbuilding Co., Brunswick, Ga., has been organized to build a plant for constructing schooners. A 3000-acre water-front site for sawmill, mold loft, shipways for six or eight vessels, storehouses, offices, etc., was purchased by the Maryland Shipbuilding Co., Baltimore, which recently incorporated with $1,000,000 capital. George L. Roberts, Sarasota, Fla., has decided to establish a plant to construct small boats for Florida bays and large vessels for the Gulf of Mexico, this yard to be located at St. Petersburg, Fla.

Launch Steel Freighters

Two steel freight steamers were launched at Mariners' Harbor, Staten Island, N. Y., on May 29, one of 7500 net tons and the other of 3500 tons. Built for foreign commerce, they are to be taken over by the United States shipping board.

The larger of the boats was built by the Standard Shipbuilding Corp. It is the first of six standard ships to be built by that concern, the second of which will be launched shortly. The new boat was christened SCANDINAVIC. She was built for a Norwegian firm. Her cost was $800,000, but at the present value of bottoms, shipping men estimated her worth at $2,000,000. She will be ready for sea on July 15, when, it is understood, the shipping board will take her over.

The second ship was launched from the plant of the Staten Island Ship-

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building Co. She was the second of six boats ordered for the Cunard line, the first having been launched a few weeks ago. The vessel was christened WARPLANE by Miss Julia Davison, daughter of the president of the company. It is understood that the entire six boats of the fleet being built for the Cunard line will also be taken over by the shipping board.

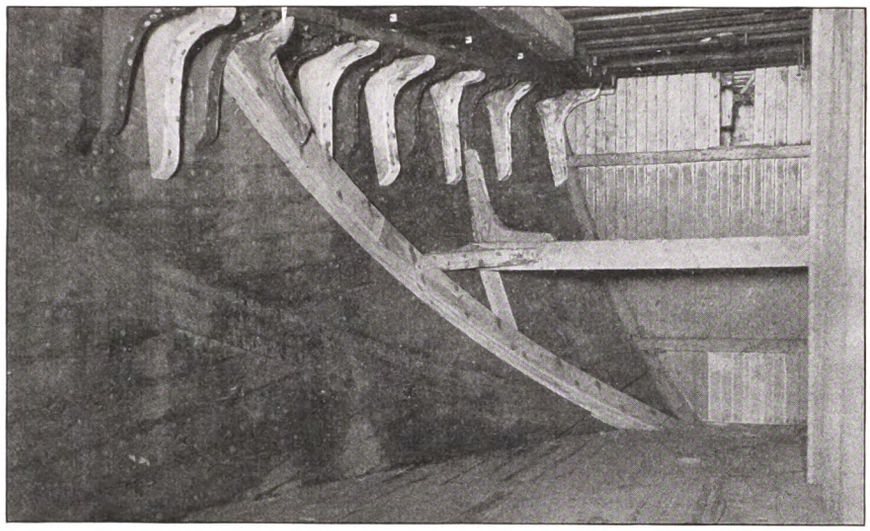
Refit Lake Steamer for Ocean Trade

The wooden steamer MOHEGAN, after 23 years of service on the Great Lakes is now "somewhere on the Atlantic". That "somewhere" may be New York harbor, or the harbor of Georgetown, British Guiana, or some place between those ports, for the former lumber carrier will ply between those points carrying bauxite ore for the Aluminum Co. of America. She will load the ore at a point some miles up the Demerara river from Georgetown.

The illustration at the foot of this page shows the MOHEGAN as she was when plying fresh water. The view at the top shows some of the reinforcement which was installed to insure her seaworthiness when breasting the Atlantic. The work was carried on at the Cleveland yard of the American Shipbuilding Co.

In the hold, 120 9 x 10-inch knees, similar to those illustrated, were placed. In addition to the 3-band steel strapping already in place, 3-pointers, 4 x 14-inch oak straps, were put in. The panting beam is 12 x 12 inches. Two bilge keelsons of three courses, 12 x 12 inches, were built fore and aft the full length of the ship. A new floor was built about 30 inches above the old one, 8 x 10-inch timbers being used. Strongbacks, 6 x 6 inches, were placed across the hatches. Carried on the stanchions forward, 6 x 6-inch timbers were placed to reinforce the deck against heavy seas. On both the forward and aft bulkhead, 6 x 8-inch stanchions were placed for further reinforcement against heavy seas. The deck rail aft was increased in height by 2 feet. New cabin quarters were built forward of boiler inclosure and extra coal bunker space provided. Extensive alterations were carried out in the crew's quarters, which now have improved light and ventilation. On the bottom and sides a specially prepared creosoted sheathing was placed.

The MOHEGAN was built at Marine City, Mich., in 1894. Her gross tonnage was 1216 and her net tonnage 1014. She is 225 feet long, 39.2 feet and 14.1 feet deep. Her alteration constituted one of the biggest repair jobs carried out on wooden ships on the lakes in a number of years. The men in charge of the work feel confident of her ability to withstand successfully any buffeting she may meet in ocean trade.



REINFORCED FOR SERVICE ON THE ATLANTIC

In addition her machine was altered to meet ocean-going requirements by fitting surface condenser, evaporating and distilling plant, Kroeschell Bros. carbonic anhydride refrigerating plant, etc.

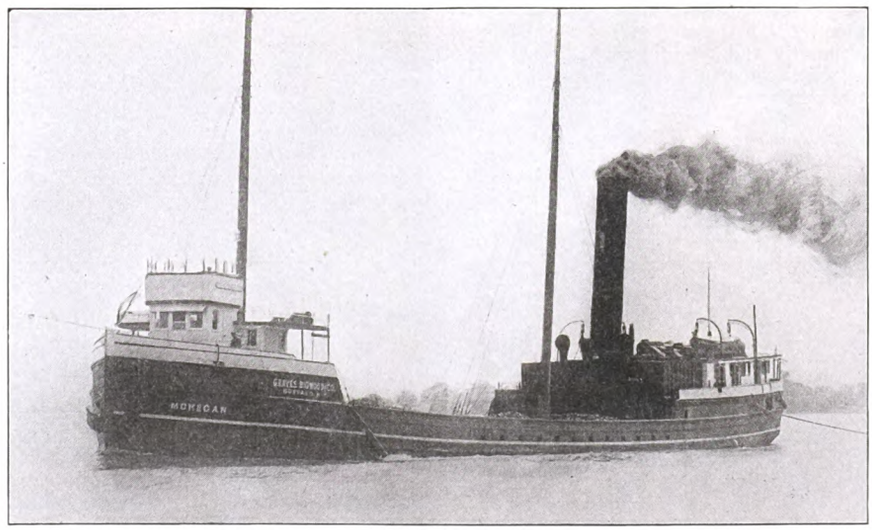
Build Chasers on Lakes

The Rocky River Dry Dock Co., Rocky River, O., is building two submarine chasers for the government. The contract price is $52,000 each. It is planned to rush the construction through quickly. The Matthews Boat Co., Port Clinton, O., is building 10 chasers, at a contract price of $52,000 each. The Burger Boat Co., Manitowoc, Wis., is building one chaser and the Great Lakes Boat Building Corp., Milwaukee, Wis., is building two, all of them at a contract price of $52,000 each. The Hartman Greiling Co., Green Bay, Wis., is building two chasers at a contract price of $40,266.75 each.

Seattle Ship Launched

The steamer STOLT-NEILSEN was launched from the yards of the Skinner & Eddy Corp., Seattle, May 22. Before she was launched STOLT-NEILSEN was chartered by Mitsui & Co. for the transpacific trade. It is said her charter rate will bring the owner $100,000 a month. STOLT-NEILSEN is the sixth vessel to be launched at the Skinner & Eddy plant since its establishment a year ago. Mrs. Egil Johnsen, wife of Captain Johnsen, representative of B. Stolt-Neilson, owner, christened the vessel, which is one of a fleet of seven contracted for by the same interests.

Three sister ships of the fleet are now in service and three remain to be launched. Each vessel is of 7800 tons capacity.



MOHEGAN BEFORE HER SALE TO SALT WATER INTERESTS

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Late Decisions in Maritime Law

Legal Tips For Ship Owners and Officers

Specially Compiled for The Marine Review

By Harry Bowne Skillman

Attorney at Law

THE relation and duties of tug to tow were in issue in the case of Gilchrist Transportation Co. vs. Great Lakes Towing Co., 237 *Federal Reporter* 432, and the court there decided that the general rule is that one undertaking towage service for another is bound to exercise reasonable skill and care in everything relating to the work undertaken, until it is accomplished; he is not an insurer, nor required to use the highest possible degree of skill and care. It was further held that a tug, in her home waters at any rate, is chargeable with knowledge of the ordinary currents and tides, the channels, depth of water and well-known obstructions. She impliedly warrants that she has sufficient power and ability to perform the service which is to be undertaken, under conditions which are to be reasonably anticipated. And she is also required to know whether, under the conditions then prevailing or reasonably to be expected, it is safe to make the proposed venture, whatever it may be. However, a mere mistake in judgment in this latter respect is not sufficient to charge her with negligence, but the error must be one which a careful and prudent navigator, surrounded by like circumstances, would not have made. Where inevitable accident is relied upon by a tug, it is incumbent upon it to show what the cause of grounding was, and that the result of the cause was inevitable, in the sense that it occurred in spite of everything that nautical skill, care and precaution could do, or to show all possible causes and as to all such that the result was inevitable in the sense which is before mentioned.

* * *

A "deserter", it was decided in STRATHEARN, 239 *Federal Reporter* 583, is one continually and intentionally absent from the ship, constituting a quitting of the service of the vessel.

* * *

It is not sufficient to charge a vessel with the fault of a collision, it was held in JOHN G. MCCULLOUGH, 239 *Federal Reporter* 111, that the stern light was not more than 10 feet lower than the forward light, instead of 15 feet, as required by Inland Rules.

* * *

That a ship is in charge of a compulsory pilot at the time of a collision for which she was in fault does not absolve her from liability for death of persons caused by such collision, according to Indra Line, Ltd., vs. Palmetto Phosphate Co., 239 *Federal Reporter* 94.

* * *

The fact that the merchant vessel ATTUALITA had been requisitioned by the Italian government and employed at a fixed hire, did not exempt it from a suit *in rem* in a court of the United States, it appearing that the vessel remained under the control and management of the owner, who employed and paid the officers and crew.—238 *Federal Reporter* 909.

* * *

A pile driver was held liable in PILE DRIVER No. 2, 239 *Federal Reporter* 489, for the action of a member of its crew in cutting off ends of piles on a catamaran alongside, which was being used together with the pile driver in repairing a ferry rack in North river, and the throwing of the ends into the river, where they became a menace to navigation.

* * *

Where a ship withdraws from a charter, the charterer may recover damages measured by the difference between the charter hire and the hire necessary to secure another vessel, if a substitute vessel equal to the vessel withdrawn can be secured. Otherwise, it was decided in ADA, 239 *Federal Reporter* 363, recovery can be had only for lost profits based upon the usual rates of freight at the time and place and the cargo that could probably have been obtained.

* * *

The steamship INDRAPURA went into drydock at Hong Kong with a partial cargo transshipped to her under through bills of lading, and the question arose in the case reported in 238 *Federal Reporter* 853, whether this act was a deviation which rendered her or her charterer liable for loss of cargo while in dock. The court found that going into drydock was in accordance with a general custom of the port, was a customary incident of the voyage, and hence that there was no liability.

* * *

The case of KRONPRINZESSIN CECILIE, 228 *Federal Reporter* 946 (see THE MARINE REVIEW of June, 1916), was reversed in 238 *Federal Reporter* 668, where the court held that the vessel was liable for failure to deliver its cargo of specie consigned to Plymouth, England, and Cherbourg, France. It was said that the wireless message sent by the owners from Bremen, "Turn back to New York," which message was prefaced by the statement that war had broken out between Germany and England, France and Russia, left the master of the boat no choice but to obey. "By assuming to direct from Bremen, as it did, the course which the ship should take, her owner assumed, for itself and the ship, all such responsibility, and lost all right to charge the master with any share of it."

* * *

"Where, after salvage service has been performed, a full and fair disclosure of the amount of salvage received is made to the crew, and the extent of their rights is fully and fairly explained to them, and they are given an opportunity of hearing this and discussing it with some third party, such as a United States commissioner, or any lawyer representing them, or any unbiased third party.... the members of the crew enter into a final agreement accepting a stipulated sum for their share of the salvage, and receive that sum and execute a release, that ought to be given full consideration as normally affecting a final settlement of this claim."—Rivers vs. Lockwood, 239 *Federal Reporter* 380. The court remarked further that salvage is paid much as a matter of public policy, to stimulate effort. And in HALCYON, 239 *Federal Reporter* 840, the court decided: "It is the theory and policy of the law of salvage to promote intrepidity, promptness and skill in rescuing the imperiled vessel. Lack of skilful operation, with or without injurious results, may diminish the award; while, on the other hand, the skilfulness of the rescue may influence the award by increasing it."

* * *

The master and chief engineer of OREGON, a merchant vessel under the flag of the United States, seized as a prize by the British, were not entitled to wages during the time they were held in custody as witnesses, it not appearing that they rendered any voluntary service to the vessel during such time. The court, in the case of Swanson et al. v. Linga et al., 238 *Federal* Reporter 253, in deciding the case, said: "Had the libelants, in an honest endeavor to save the ship and its cargo for their owners, remained voluntarily by the ship until condemnation, or until all hope of recovery was gone, their case would fall within principles fairly well settled. * * * For such involuntary services performed on the constraint of the captors, and it may be for their benefit, they have no claim upon the owners." The court also said: "It has been frequently held that upon the capture of a neutral vessel by a belligerent it is the duty of the master to remain by the ship until a condemnation, or until all hope of recovery is gone, and that he is entrusted with authority and obligation to interpose a claim for the property before the proper tribunal, and to endeavor by all means in his power to make a just and proper defense, and that, as these are his duties, he is entitled to receive compensation for his services in performing them, such compensation to be paid by the owner of the ship in the first instance, and ultimately as a general average charge by all the parties in interest."

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Sailing the Lakes 60 Years Ago

The Late Captain Andrews, Master of First Sailing Vessel to Pass Through Soo Canal, Had Written of His Experiences—Carrying Food to Starving Ontonogan

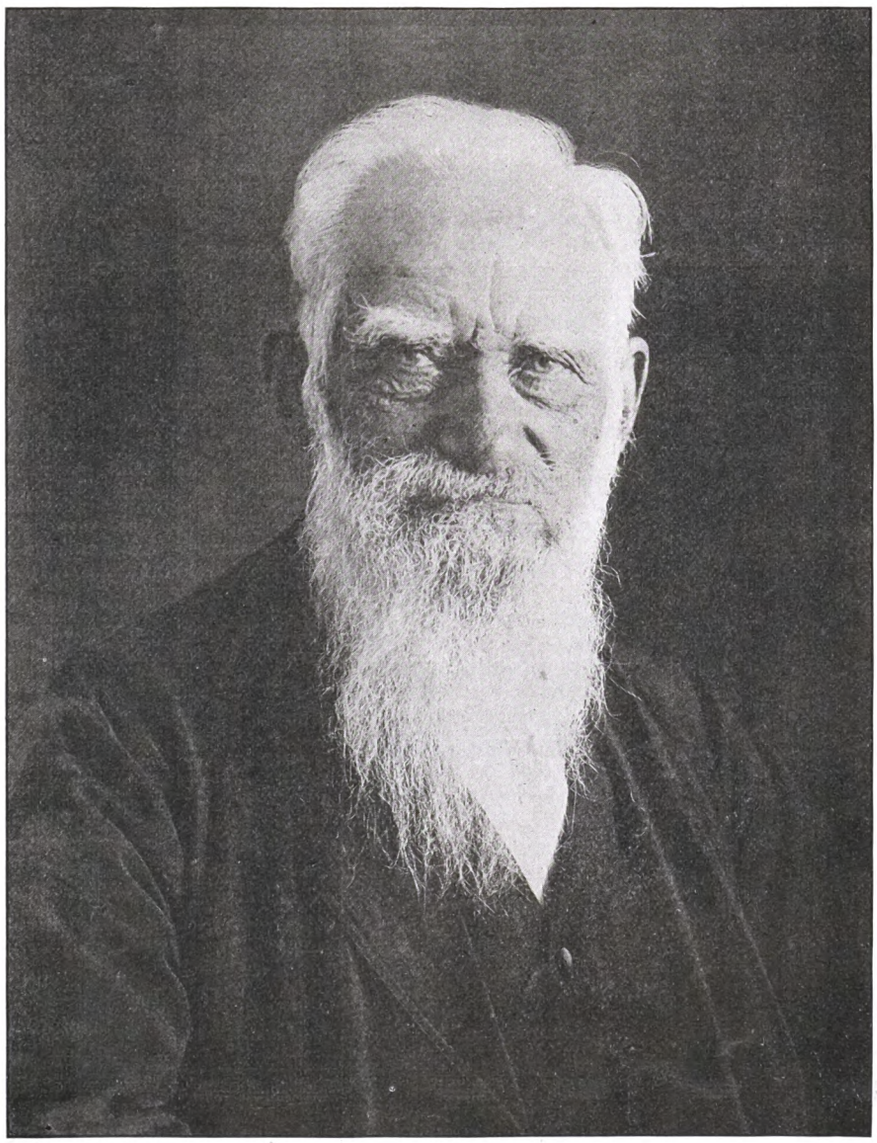
IN THE death at West Palm Beach, Fla., a short time ago, of Capt. J. H. Andrews, the Great Lakes lost a navigator who had been intimately associated with its commerce for more than half a century. Twenty years ago, at the age of 67, Captain Andrews moved to Florida. Until his death, however, he maintained a close interest in lake affairs.

Captain Andrews was the first man to make a complete trip from the lower lakes into Lake Superior. As master of the schooner FREEMAN, he passed through the Soo canal on July 3, 1855, only 15 days after the first canal had been thrown open to commerce. He brought down the first cargo of iron ore. Late in one season, he braved the dangers of a December storm on Lake Superior to carry winter supplies to the starving villagers at Ontonogan. After selling his vessel, he made the perilous trip on snowshoes through the trackless wilds of Wisconsin and Michigan. In THE MARINE REVIEW of June 16, 1904, Captain Andrews recounted a few "Knots from an Old Sailor's Log Line". "I commenced sailing on the Great Lakes early in the forties, to be exact, in 1843, beginning in the class of vessels that were in commission in those times, brigs, schooners and barques. Believing it will be of interest to some of the old-timers, who, if alive, will remember them, I will give some of the names of those early craft, most of which are now but a memory. I drifted about, in my early seafaring life, as sailors are wont to do, having sailed in the schooner CAMBRIA, brig ALERT, schooner PHILENA MILLS, brig SCOTT, brig CATALIA, brig ODD FELLOW, brig GLOBE, brig MARY OF CHICAGO, and was in this latter vessel, in 1849, the year of the big freshet in Chicago.

"Some time later I went to the brig BOSTON, brig BANNER, brig JOHN IRWIN and barque MORGAN. My first charge as master was the schooner FLYING DUTCHMAN, and in 1850 I witnessed the burning of the steamer GRIFFITH on Lake Erie.

"In 1853 I took charge of the schooner SEAMAN and was in the lower lake trade most of that year, carrying, however, one cargo of powder to Sault Ste. Marie, consigned to Spaulding & Childs. In 1854 I carried one cargo of powder to the Soo in June and also one cargo of stone for the locks. I left Port Colborne on Nov. 23 with a cargo of powder, bound for Sault Ste. Marie and arrived there on Dec. 2; was in company with the schooner GRAND TURK, which went ashore at Presque Isle. She was the only vessel we saw on Lake Huron and we were the only vessels that got through Lake Huron after Nov. 25 of that year. We finished discharging our cargo on the morning of Dec. 4, the thermometer standing at 11 degrees below zero and I got under way for Cleveland, but succeeded in getting only as far as the foot of Lake George, where, in one night, the vessel froze fast in 6 inches of solid ice. I concluded to strip the vessel, and, leaving one man on board, took the rest of the crew, and, crossing Sugar island to Hay lake, went back to the Soo. I made several trips to the frozen-up vessel that winter before I left for Cleveland, using snowshoes.

"Deeming it inexpedient to remain at the Soo all winter, I fitted out for a 'snowshoe voyage' to Cleveland, and on Jan. 17, 1855, in company with my mate,



THE LATE CAPT. J. H. ANDREWS,
A Real Veteran of the Great Lakes, He Never Failed to Deliver a Cargo Which Was Consigned to His Care

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Capt. William Jackson, an Indian, and two dogs, took my departure from the Soo on snowshoes, by way of Mackinac and Saginaw, the only conveyance to be had in those days. Few of my readers are in a position to realize what hardships such a trip as this entails. After 31 days of continuous toil we succeeded in finishing our trip; no sleepers to ride in at that time.

"In March of 1855 I took charge of the brig FREEMAN, belonging to the same owner, H. N. Gates. On the opening of navigation I loaded a cargo of coal and grindstones for Milwaukee after discharging loaded wheat at 26 cents per bushel for Ogdensburg. On delivering this wheat at Ogdensburg, I loaded a cargo of Scotch bloom iron at Prescott for Cleveland, after which went to Buffalo and loaded 7000 kegs of powder for Lake Superior, shipped by Niles & Kinney. Arrived at Sault Ste. Marie about the middle of June where I dicharged some of the powder and where I succeeded in getting some charts of the Hudson Bay Fur Co. These charts were made by Lieutenant Bayfield, an Englishman, in 1825.

"On June 18 went on up to the lock to go through and found the schooner FORD, Capt. John Parker, in the lock bound down. When he came out of the lock, loaded with copper, I took it, bound up, the FREEMAN thus being the first sail vessel passing through the lock bound up. Two steamers had gone through before, being the ILLINOIS and NORTH STAR. We set the fore topsail and sailed on to Lake Superior; calling at Marquette, I left 360 kegs of powder and proceeded on to Eagle river, where I landed more of my cargo and passed on to Ontonogan and finished unloading my cargo of powder there. At Ontonogan I took in 152 tons of mass copper and 30 tons of stamp copper consigned to the smelting works at Detroit. After discharging this copper at Detroit, I went on over to Cleveland and took in part of a cargo of supplies at Hanna & Garrettson's for Lake Superior points, comprising Eagle river, Ontonogan and La Pointe.

The First Ore Cargo

"On returning to the Soo, took in 200 tons of iron ore from Thomas McKnight's dock, which was brought to the Soo from Marquette by the steamer NAPOLEON, before the canal was open. This was are *first* ore I ever knew of being brought from Lake Superior by sail. The date was, I believe, August, 1855. There were but very few tugs at that time on the lower rivers, hence we were forced to sail through. After landing this ore at Cleveland, I made a quick trip again to Lake Superior with only part of a load and returned immediately to Cleveland for part of a load and went over to Detroit, finishing out with lumber for the stamp mill at Ontonogan.

"There being at this time no copper or iron ore at Marquette, I returned to Monroe (Lake Erie) and loaded flour and West India stores for Buffalo. My next cargo was made up at Buffalo, Cleveland and Detroit for Ontonogan and way ports. During this time the brig FREEMAN was sold to parties at Ontonogan, where I took her and discharged her cargo, taking in, for the return trip, 50 tons of mass copper and 8 tons barrel copper at $8.50 per ton freight. I took this to the Detroit Smelting Works in a few hours over three days, where, after discharging, I turned the vessel over to Capt. John Haloran on Nov. 11. Capt. George P. McKay went first mate.

Starting a Perilous Voyage

"Returning to Cleveland, I found my old schooner SEAMAN all loaded for Ontonogan and in trouble. She had no captain, no anchors and chains, part of her sails blown away and in a mess generally. She had started on her voyage and had been forced to return in a disabled condition. Her captain and crew had refused to go out with her again. She had about a $4,000 freight in her and the underwriters had refused to take any risk on vessel or cargo. The owner of the vessel, H. N. Gates, and the owners of the cargo held a consultation and, at the time of my arrival, had decided to unload the vessel. Mr. Gates asked them if they would leave the cargo in her if I would take charge of the vessel. On his part, Mr. Gates said, if I would take charge of the SEAMAN he would take the risk on the vessel himself. The owners of the cargo consenting to this arrangement, Mr. Gates turned to me and said: 'I insist on you going with the schooner SEAMAN.' I answered him: 'All right, I will go as far as I can with her.'

"I procured new anchors and chains, but found a very hard task in securing a crew. Every sailor thought he would be frozen to death if he went on board of her. I succeeded at last in getting a crew and departed, arriving at the Soo about Nov. 20 and found the FREEMAN and FORD there, bound to Ontonogan. Captain McKay had been injured in getting through the lock and had to be carried ashore. We were windbound about three days, but finally got a fair wind. The SEAMAN had in 4000 kegs of powder and a heavy deck load of barrels. Our fair wind took us to Copper Harbor, where the FREEMAN and FORD went and did not come out again that year. The FREEMAN struck a rock and sank in the harbor.

"I hung outside and got a gale of wind fair and ran for Ontonogan. Arriving off Ontonogan, I hove to and the storm abating stood in for the place. Found the steamers OGONTZ and NORTH STAR there and they could not land their freight. I could not get inside and the little schooner ALGONQUIN came out and took my deck load, which just about filled her up. At this juncture another snow storm burst upon us and I was forced to run for La Pointe for a harbor 90 miles away and to my astonishment the ALGONQUIN followed me instead of going into the harbor, which she could have done. The steamers scattered and left the balance of their cargoes at Ba De Gris and left the lake for that season. I got into LaPointe on Friday night, but no ALGONQUIN showed up. (It snowed about 3 feet during that gale.) I had made up my mind that my deck load was gone. It was still snowing and everything frozen up and about 2 p. m. the ALGONQUIN came around the foot of Madeline island into the harbor. Lowering away a boat I pulled to her and found she had been hove to during the gale and had lost but one barrel. It had been so thick they could not find the place.

"After the weather abated we got under way and went on back to Ontonogan. The ALGONQUIN got in all right, but it was necessary for me to lighter more cargo before I could get over the bar. With another wild snow storm beginning to make, this was anything but a pleasant outlook and all we could do was to lay to until it was over. With the thermometer 12 degrees below zero and the vessel loaded down with ice, I made the attempt the moment the storm began to abate, first lowering away a boat after letting go an anchor, and pulling inside. The people begged me to run the vessel ashore, saying they were so short of provisions they must have my cargo. Flour was $25 per barrel and very little to be had. I said it was out of the question to purposely beach my vessel and if they did not try to assist me to get inside I would leave and not return there again that winter. It was then Dec. 7.

Over the Bar

"We pulled back to the vessel, sounding on the bar as we went. I found there was within 4 inches of water we were drawing and another snow storm brewing, determined to make a last effort to get inside—and kept off for the buoy I had dropped when we sounded out. The vessel went about half way over the bar, stopped and began to pound, but keeping all the sail on her that I could, she lifted over, went on over and into the river about 4:30 p. m. on Dec. 7. She fetched up in the ice and the next day we cut her alongside the dock with saws and began to discharge the cargo in a whirling snow storm.

"Determining to send the SEAMAN to Copper Harbor to get some of the

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cargo of the FORD and FREEMAN, the people came to me and made known their wishes. To this I replied, stating I could not think of going outside again that winter with a sailing vessel. They insisted that some one must go and offered to purchase the ship. To this proposition I consented and, making a price, they took her and placed a Captain Beaser in command. The weather softening up some, he secured a crew and left at once for Copper Harbor, and as he had a fair wind, the people naturally looked for a quick trip. (Will state here that, while I did not learn the facts until the following May, the SEAMAN went on the rocks at Copper Harbor between the shore and the lighthouse, within 12 hours after I sold her.)

On Snowshoes to Cleveland

"I stopped at Ontonogan until Jan. 14, 1856, and then fitted out for my second snowshoe trip to Cleveland. Perhaps had I then realized the terrible hardships and suffering we were to undergo, I would not have undertaken it, nor is it my purpose to go into much detail in an article of this character. What is given is only for the purpose of illustrating the great difference in past and present conditions. Should a trip to Cleveland now be necessary, it would mean but a few hours of luxurious travel, but at that time weeks of danger, of toil and great suffering surely were in store for the undertakers of a snowshoe trip through the pathless virgin forests in the midst of a northern winter, and as I gaze on the old-time-worn shoes hanging on the wall by my side as I write, and with the events of that soul-trying journey crowding my memory, I cannot but exclaim, 'How dared I undertake it?'

"After stopping over one night at the Minnesota mine, we left for Cleveland, plunging into the heart of the forest and traveling by compass entirely. For 30 days we floundered through the snow, suffering all the tortures that cold and hunger could inflict. On the thirtieth day, when all my party had sat down to die, fainting with starvation, as we had had but one raw hedge hog to eat for three days and nothing at all after that was consumed, I went on ahead in sheer desperation. Suddenly I came on to a water hole in the ice on a creek and a path leading up over the bank. With a new heart I hastened on the back track to find my companions. Only by beating, pleading and shoving them along could I force them to move. In that gasping lethargy, which always precedes the sleep of a death by freezing, they were indifferent to their end.

"We did finally fetch up in a logging shanty on the Wisconsin river, it being occupied by the lumberman whose water hole in the ice I had discovered. This shanty was about 25 miles north of what is now Portage City. It does seem hard that with over $12,000 in my possession I could not buy anything to eat, but it was of no more use than chaff. After recuperating we secured conveyance by horse and sled to Madison, Wis., where we took the cars to Chicago on the old Galena railroad. There I learned by hearsay that the SEAMAN had been lost and the crew frozen, although, as before stated, secured the facts the next May.

"On my way from Chicago to Cleveland we stopped at Oberlin and chancing to look out of the car window saw my owner, Mr. Gates. Immediately going out, I said: 'How do you do, Mr. Gates?' With a look of startled astonishment, he stepped back and as soon as he could control his voice, said: 'Is that you, captain? I thought you were dead,' and, approaching, took hold of my arm. 'No, sir, I am not dead.' I replied. 'I see you are not, but where is my schooner SEAMAN?' 'That I do not know, sir, but come into the car and I will tell you where I last saw her.' After we had seated ourselves, he continued: 'It is a very singular thing to take charge of a man's vessel and not know what you have done with her.' I replied, 'I do know what I did with her; I have her in my pocket, but the last I saw of her in the flesh was on Dec. 11, 1855, and she was going 'winged out' for Copper Harbor.' I then told him what I had got for the vessel and had that as well as the freight in my pocket, also that the crew were all alive. 'If that is so, I am satisfied,' he said. On our arrival at Cleveland I turned the proceeds of the voyage over to him.

Locomotives for Marquette

"After this I took command of the schooner E. C. ROBERTS, building in Cleveland and owned by Bacon & Redington. The latter had been with my last owner, Mr. Gates, two years, while I was sailing for him. With the ROBERTS I was in the Lake Superior trade about six years, during which time Mr. Bacon sold his interest in her to C. T. Harvey, who built the Soo canal. He owned her two years. I was mostly in the iron trade and carried some mining supplies and furnaces and took the second locomotive that went to Marquette to haul iron ore from the mines; also two cargoes of railroad iron for the track with which to operate same. I also carried nearly all the output of the Pioneer furnace for two years and distributed it from Chicago to Buffalo while Mr. Harvey owned the vessel; and in 1858 I took the boiler of the CITY OF SUPERIOR off of Copper Point. This vessel was lost the preceding fall.

"The winter of 1861, after laying up the E. C. ROBERTS, I went to Black River, now Lorain, and built the barque WILLIAM JONES, owned by J. A. Redington and myself, and handled her 11 years successfully in the Lake Superior and Lake Michigan trade; then, with Mr. Redington, built the schooner NELLIE REDINGTON in Cleveland and sailed her successfully for 21 years.

Delivered Every Cargo

"It is a matter of pardonable pride to the writer that of the many cargoes handled by me I never failed to deliver every pound to its rightful owner, and as these flights of memory are about the only thing an old mariner can indulge in, I cannot but feel satisfied with my long career; long, indeed, for on May 2, 1904, it was 61 years since I began my seafaring life and one-half a century was spent on the Great Lakes. I have made several trips to the head of Lake Superior lately and appreciate fully the great changes in the shipping, which, as my readers all know, is now done with large fine steel steamers; no yards to haul, no traverse to work, straight away the course you go and never mind the winds that blow.

"Closing my career as a commander with the sale of the NELLIE REDINGTON, I migrated to the east coast of Florida, lat. 27, long. 80, where from my window I can see my present ship, a 30-foot sloop, lying at anchor on the Indian river. So, as I began with small ships, I close.

"My hair is white, my eye is dim,
My chance to stay much longer is slim,
Farewell, Lake Superior, her waters clear,
Her hills to me that once were dear,
A summer clime is the place for me,
A sunny clime down by the sea."

How Wooden Ships Are Built---II

(*Concluded from page 237*)

gether. Edge bolting means fastening the pieces together longitudinally. In other words, the ceiling strakes are bolted through and through to each other, as well as being bolted to the frame timbers. There is no doubt that this form of fastening adds greatly to the strength of the hull structure, particularly in a longitudinal direction, offering resistance to hogging strains. In fact, some experts go as far as to say that the edge-bolting is all that prevents the largest of wooden ships from breaking-up in a seaway. This is probably an exaggeration, although it has been demonstrated that timbers well edge-bolted at least approximate the strength of single pieces of the size of the members so combined.

Capt. H. W. Butler, Phippsburg, Me., master of the six-masted schooner EDWARD B. WINSLOW, has retired.

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On the Coasts, Lakes and Rivers

What's Doing and Who's Doing It

News of Lakes as Season Gets Under Way

By C. M. Krauss

GEORGE A. MARR, secretary, Lake Carriers' association, took measures well ahead of the day for general registration, to insure that all men employed on the lakes who were between 21 and 31 years old registered on June 5. He asked that all captains and chief engineers notify the members of the crew that they should register the first time they reached a port in order that their registration certificates would be in the hands of the authorities on the stipulated date.

* * *

Grain tonnages for early June loading was marked up as high as 7 cents late in May. Some of the boats receiving this figure may not be able to figure in the market again until late in the season as ore contracts will keep them busy for most of the year.

* * *

Coal receipts at Milwaukee from the opening of navigation to June 1 showed a considerable decrease compared with the same period of last year. This year's receipts were 85,257 tons of hard coal and 466,872 tons of soft coal against receipts last year of 128,551 tons of hard coal and 712,038 tons of soft coal.

* * *

A Welland canal boat bearing the yard No. 645 and being built for Norwegian parties, was launched at the Cleveland yard of the American Ship Building Co. on May 26. She will leave for salt water within a few days.

* * *

Some discussion is being heard in Chicago of a plan to erect a shipbuilding plant near Gary, Ind., where the United States Steel Corp. operates both a plate mill and a fabricating shop.

* * *

The steamer HORACE S. WILKINSON, built by the Toledo Ship Building Co., Toledo, for the Great Lakes Steamship Co., Cleveland, left Toledo on May 29 for her maiden voyage. The WILKINSON is 600 feet long, her dimensions being the same as the other vessels of the standard 600-foot size which have been built generally by lake interests during the past few years.

* * *

Considerable interest is manifested around the lakes in the opening of the New York state barge canal. A part of the canal is now in service and the entire route between Buffalo and New York will be opened by July 1. Representatives of the council of national defense have considered the availability of the canal for handling large tonnages of grain between Buffalo and seaboard and thus lighten the burden upon the railroads. It seems certain that the canal will figure prominently in the government's plan for relieving traffic congestion. Through service from Buffalo, Cleveland and Detroit will be furnished by the Detroit & Cleveland Navigation Co. and the Shippers' Navigation Co.

* * *

On June 2 the recommended draught for the Canadian lock at the Soo was marked up 2 inches for upbound boats and 1 inch for downbound boats, giving the former a draught of 19 feet 8 inches and the latter a draught of 20 feet.

* * *

The steamer TOULOUSE, built at Superior for French interests, has left for the coast after bringing a cargo of grain from Port Arthur to Buffalo.

* * *

The 600-foot bulk freighter PONTIAC, just built for the Cleveland-Cliffs Iron Co., Cleveland, started on her maiden trip from Toledo on May 26 with a cargo of 13,500 tons of soft coal.

* * *

Some old contracts for carrying coal have been rewritten. Some coal carriers who have long-term contracts at 30 cents have received an advance of 10 cents a ton, it is understood. The change was made on account of the advance in the price of fuel and generally higher operating costs. The coal situation is rather unsettled as some contracts have not been fixed, although cargoes have been delivered. Fifty cents was paid on one contract during June on coal delivered in the previous month.

* * *

Coal shipments out of Conneaut showed an increase in May compared with the same month last year, but the ore receipts fell off. Coal shipments were 344,100 tons and ore receipts 846,845 tons.

* * *

The new self-unloading steamer CARL D. BRADLEY, built at the Lorain yard of the American Ship Building Co., has cleared on her maiden trip. She is a sister ship of the W. F. WHITE, which was described in THE MARINE REVIEW of October, 1915, but carries several additional improvements which better adapt her for the stone-carrying trade.

* * *

The American Ship Building Co., Cleveland, has taken orders for two tugs to be built at the Buffalo yard for the government. These boats will be 156 feet long, 40 feet beam, and 17½ feet deep. The American company has signed contracts for 36 vessels since the beginning of the year, 34 of these boats being scheduled for delivery in 1918. With the exception of one tanker, these boats are all for salt water service.

* * *

The first ore cargo to reach Conneaut was brought in the steamer MATAAFA on May 7, the latest date at which the season has been opened for several years.

* * *

The first vessel to make a round trip from Buffalo to the head of Lake Superior and return was the steamer T. H. WICKWIRE of Boland & Cornelius, Capt. James T. Herbert, master. She left Buffalo on April 24 and delivered a cargo of coal at Ft. William. She reached Buffalo on May 8 with a cargo of 348,312 bushels of grain. The steamer J. S. DUNHAM, commanded by Captain Frank C. Pratt, which left Buffalo on the same day, took only a few hours longer to make the round trip.

* * *

A contract has been awarded to the Stevens Construction Co., Chicago, for building a new unloading tower on the Anchor line property near the structure which was damaged by fire late in April. The unloader will cost about $100,000.

* * *

The old wooden freighter JOHN PLANKINTON collided with the Grand Trunk railway carferry DETROIT, in the Detroit river on May 9 and sank almost immediately. The bows of the PLANKINTON were crushed in. The freighter was built in West Bay City in 1889 and is 267 feet long, 40.9 feet beam and 21 feet deep. The steamer WISSAHICKON of the Great Lakes Transit Corp. ran on to the sunken wreck on May 21. After lightering about 30,000 bushels of grain, the WISSAHICKON was released May 24. She was only slightly damaged, and resumed her trip to Buffalo.

* * *

A steamer was chartered for the opening trip from Buffalo to Duluth to carry grain at 6¼ cents. This rate marked a record for opening shipments since the coming of the lake steel freighter.

* * *

Superior shipyards have contracts for constructing 18 steamers according to advices from that city. Ten of these boats will be 263 feet long, 43 feet beam and 20 feet draught with a capacity of about 2100 tons. The other eight boats will be trawlers. The American Ship Building Co. is the parent company which controls the Superior Ship Building Co. at Superior, while the McDougal-Duluth Ship Building Co.

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and the Globe Ship Building Co. also operate yards in that city.

* * *

The steamer ORION of the Orion Transportation Co., Green Bay, Wis., has been sold to Herman Greiling of Greiling Bros., Green Bay.

* * *

About 30 men employed at the American canals at the Soo have petitioned Newton D. Baker, secretary of war, for an increase of 20 per cent in pay. They also ask to be permitted to buy supplies from the government at Fort Brady, a privilege now given to discharged soldiers and pensioners of the government. The petition states that when the United States took over the canal in 1881, General Weitzel, United States engineer in charge, used as a basis for figuring, the wages paid on steamboats. At that time a captain received $1200 annually, mates $75 a month, engineers $90 a month, second engineers $70 a month. At the present time, the assistant superintendent of the canal force is receiving $1320 annually, the first lock man $75 monthly, the chief engineman $120 monthly, the foreman lock master $80 to $85 monthly and the assistant engineman $80 to $90 monthly.

* * *

Blocks of ore to be moved from ports at the head of Lake Superior to run through the season have been covered recently at $1.50 a ton free, an advance of 50c over the general rate. Wild rates a year ago were marked up 50 cents a ton at about the same time. Little wild chartering has been done so far this season, as the long delay in opening the season left few boats in position to seek additional business.

* * *

The Pringle Barge line has purchased the supply steamer SUPERIOR from the Pittsburgh Steamship Co. The machinery will be placed in a new tug which is being built for general towing. Captain Pringle has sold the tug DUNCAN CITY to Carl D. Bradley, Calcite, Mich., where she will be used for harbor towing.

* * *

Fires proved troublesome during the latter part of May to boats navigating on Lake Superior and a number of vessels lost considerable time.

* * *

The steamer WINNIPEG has been fitted at Toledo to carry automobiles between Toledo, Cleveland and Buffalo. She was recently purchased by George Warner, Cleveland.

* * *

The steamer WAR CROSS, built at Cleveland by the American Ship Building Co. for the Cunard line, left for salt water on May 19. She is of the standard Welland canal size.

* * *

The Norwegian steamer CLEVELAND, built at the Superior yards of the American Ship Building Co., entered Buffalo harbor on May 21 with a cargo of flax from Ft. William, being the first ship to enter that port flying the Norwegian flag. She left for salt water the next day.

* * *

The tugs MINICTAGO and BURKE, each towing a scow, arrived in Erie on May 24 to load a cargo of coal for Trenton, Ont. The use of scows in carrying coal clearly reflects the scarcity of tonnage.

Around Puget Sound

By F. K. Haskell

THE entire transpacific fleet of the Blue Funnel line including the liners PROTESILAUS, TALTHYBIUS and IXION, which have been plying between Seattle and ports in the Orient, has been commandeered by the British admiralty. Their loss from Puget sound traffic will be more than offset by increases announced in the fleets of Japanese and Norwegian ships plying in the transpacific trade. Big carriers have been requisitioned as needed by the entente allies, but the commandeering of the Oriental fleet of the Blue Funnel line is the first time that Great Britain has taken over for government service in one order all the vessels operated on one trade route. This condition has been anticipated by the Nippon Yusen Kaisha, Osaka Shosen Kaisha, Mitsui & Co. and other companies and firms operating in the oriental trade. Among these others there are Frank Waterhouse & Co., A. M. Gillespie and Thorndyke & Trenholme, who have chartered freighters in the oriental trade which will aid in moving the enormous cargoes offering.

* * *

The keel of the first boat to be built in Kelso, Wash., for many years was laid there recently. Louis Paquet is in charge of the building operations. A number of boats will be launched from this port during the summer for operation on the Columbia river.

* * *

President P. D. Sloan of the Sloan Shipyards Corporation, Olympia, Wash., announced to his 200 employes that they would participate in the profits of the company and are to receive 7 per cent of their wages at the end of each year—the same percentage that is paid to the holders of preferred stock.

* * *

Lloyd J. Wentworth, president of the Portland Lumber Co., has been named Oregon representative of Major-General Goethals. He will have charge of the shipbuilding in Portland for the government and will work in conjunction with Capt. John F. Blain, Seattle, who has the northwest territory.

* * *

Wooden shipbuilders of Seattle and Tacoma were guests recently at a banquet given by L. H. Griffiths, Seattle. The purpose of the meeting was to advance the wooden shipbuilding industry. Among the speakers were Joseph A. Sloan, Capt. J. L. Anderson, Capt. O. D. Treiber, Nicholas Babare and J. H. Hyde.

* * *

Capt. J. F. Blain, northwestern representative of the United States shipping board, has announced the following appointments to his staff: Harry Brandt, well-known Seattle steamship man, chief clerk; Capt. W. A. Magee, Astoria, shipbuilding expert and steamship master, traveling inspector; Capt. W. Z. Haskins, former chief officer of the CONGRESS inspector; Elwyn H. Burns, former first assistant engineer of the CONGRESS, chief engineering inspector.

* * *

The 10-000-ton steel motorship GEORGE WASHINGTON has been chartered by H. F. Ostrander at private terms for a voyage from Puget sound to Manila and Honolulu. The vessel loaded early in June. The addition of the GEORGE WASHINGTON makes four vessels in the Ostrander oriental fleet.

Boston Bay News

By George S. Hudson

A new freight service between Providence, R. I., and Philadelphia is about to be inaugurated by Capt. Theodore Krum, Melrose, Mass., formerly owner of the steamship CITY OF PHILADELPHIA. Captain Krum has purchased the 500-ton steamer THETIS and will secure several motor-driven vessels for the service.

* * *

Fire in the holds of the British steamship MATOPPO, at Boston, resulted in serious damage to the ship's tunnel and propeller shaft when bales of jute and gunnies expanding from water poured into the holds crushed the structure. The shaft had to be removed and straightened. The damage to ship and cargo amounted to about $200,000; temporary repairs are being made at Boston.

* * *

The White Oak Transportation Co., owner of the whaleback steamer BAY PORT, which sank in the Cape Cod canal, Dec. 13, has brought suit against the canal company to recover the value of the vessel which was blown up to open the waterway.

* * *

Wilfrid O. White, member of the maritime committee of the Boston chamber of commerce, has been commissioned lieutenant, senior grade, and attached to the office of the chief of staff at the Boston navy yard where he will have charge of compass equipment.

* * *

Capt. Alexander A. Corkum, member of Volunteer Harbor No. 4 and the Boston marine society, a well-known master of steam yachts, has been engaged as commander of the former German steamship KOLN, now undergoing machinery repairs at Boston.

* * *

Capt. M. H. Blake, Boothbay, Me., recently master of the schooner IDA C. SOUTHARD, has been secured to command the six-masted schooner RUTH E. MERRILL in the transatlantic trade of the France & Canada Steamship Co., which purchased the vessel from the J. S. Winslow Co., Portland, Me.

* * *

Capt. Angus McLeod, Somerville, Mass., 40 years a coasting skipper, has retired with the sale of the six-masted schooner WYOMING by the J. S. Winslow Co. to the France & Canada Steamship Co. James Brown, for 35 years a steward with Captain McLeod, also has retired from the sea.

* * *

Six steam colliers, the HAMPDEN, TRANSPORTATION, COASTWISE, BRISTOL, NORFOLK and MIDDLESEX, owned by the Coastwise Transportation Co., Boston, were tied up by a strike for increased wages.

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Red Hot Tips From the Trade

Pertinent Suggestions and Personal Gossip

THE Edward Valve & Mfg. Co., Chicago, is distributing a 94-page booklet devoted to valves made of semisteel, bronze, steel and monel metal. The steel employed is said to have an elastic limit of 37,340 pounds per square inch, and a tensile strength of 72,650 pounds per square inch. Monel metal is especially recommended for valve trimmings in use under severe conditions. This material is said to be tough and ductile, to resist corrosion, and to maintain its strength under high temperatures. Monel metal is approximately 67 per cent nickel, 28 per cent copper, and 5 per cent other metals, and contains no zinc, tin or antimony. In the body of the catalog considerable space is devoted to descriptions of the valves, particularly to interesting features in their design patented by the Edward company, and to price lists and specification tables.

Taking Care of Boats

The Murphy Varnish Co., Newark, N. J., is distributing an attractive booklet on the proper care of boats. The booklet contains a number of handsome drawings, printed in two and three colors. In addition, a number of interesting points regarding the correct use of varnish in preserving boats are given.

Soot Blowers

"How Some Ship Owners Have Increased Their Profits" is the title of a new bulletin issued by the Diamond Power Specialty Co., Detroit, to describe the features of its soot blowers. Ship boilers equipped with mechanical blowers may be blown regularly at intervals of from 6 to 12 hours, depending upon the quality of the fuel, without waiting for an occasional opportunity to open the breeching doors and bank fires. These blowers, which may be applied to all types of marine boilers, are said to effect a fuel saving of about 5 per cent. Boiler efficiencies are thereby increased from 4 to 8 per cent. An interesting portion of the pamphlet describes graphically the heat-resisting characteristics of soot, showing the percentage of fuel loss for deposits of various thickness. It is stated that soot is five times as effective a heat insulator as asbestos. Numerous illustrations show vessels that have been equipped with the Diamond company's blowers, as well as cross sections of boilers to indicate the method of installing the blowers. An effective portion of the bulletin shows a method of figuring the saving of fuel resulting from the proper cleaning of boilers.

Elected President

John D. Hurley, who has been vice president of the Independent Pneumatic Tool Co., Chicago, since its organization, was elected president of the company at a special meeting of the board of directors on May 3. He succeeds the late James Buchanan Brady. Mr. Hurley has been identified with the pneumatic tool business since these tools were first placed on the market. Ralph S. Cooper, who has been manager of the New York office for the past 12 years, was elected vice president, and Robert T. Scott, manager of the company's Pittsburgh branch, was elected a director and member of the executive committee.

Small Tools

A complete and widely varied assortment of small tools manufactured by the Goodell-Pratt Co., toolsmith, Greenfield, Mass., is described in a new toolbook issued recently by the company. The catalog shows illustrations and gives the prices of automatic punches and drills, breast drills, handtool sets, braces, screw drivers and similar tools. In addition to these, the company's grinder heads, micrometers, rules and calipers are also described. The booklet is of convenient pocket size and is so arranged that the various descriptions may easily be found.

Will Act as Counsel

A. A. Gray and Charles L. Benjamin have organized the firm of Gray & Benjamin, with headquarters in the Transportation building, Chicago, and will serve as advertising counsel to manufacturers of electrical, mechanical, chemical and kindred products. They will analyze and report upon problems of manufacture and distribution and will supervise the preparation of advertising copy for technical and trade papers, booklets, house-organs, catalogs and incidental advertising propaganda.

Mr. Gray was managing editor of *The Electrical Review and Western Electrician* for many years and also served a term as president of the Federation of Trade Press associations, and more recently, was president of the Associated Business Papers, Inc. Mr. Benjamin has been engaged in advertising work since 1888. For a period of nine years, he was advertising manager of the Cutler-Hammer Mfg. Co., Milwaukee, and for the past two years he has engaged in advertising work on his own account.

Expect Big Season

Officials of the Cleveland & Buffalo Transit Co., Cleveland, predict that the coming season will surpass all others in the volume of passenger and freight traffic between Cleveland and Buffalo. The first few weeks of business this season furnish conservative grounds for this prediction, as the early traffic has been unusually heavy. Three steamers, the SEEANDBEE, the CITY OF ERIE, and the CITY OF BUFFALO, are now plying between these Lake Erie ports.

Piston Rod Packing

The C. Lee Cook Mfg. Co., Louisville, Ky., recently issued a 24-page bulletin devoted to metallic piston rod packing. How the packing is maintained in a tight position on the rod by springs and followers is shown clearly in diagrammatic views of the arrangement in the stuffing boxes of the various packing rings and accessories of both the single and double type. Split metallic piston rod packing for use in steam engines, in refrigerating machinery is also described and illustrated. In the double type packing for corliss engines a tap is entered into the stuffing box by means of a pipe, on which a globe valve is placed, and which is led off to the receiver. The receiver pressure thus introduced between the two sets of babbitt rings is said to act as a steam seal, balancing the atmospheric pressure. This method is said to also act as a drain for condensation. A number of large vessels in the United States navy are completely equipped with the company's packing.

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Equipment Used Afloat and Ashore

Ship Timber Beveling and Forming Machine—Shipyard Crane—Steel Bending Brake

MODERN, high-pressure demands have brought about radical changes in wooden shipbuilding methods. In the days of the New England tea clippers hand labor was depended upon almost exclusively in the yards on both sides of the Atlantic. Today, in wooden shipyards as in other industries, machines are displacing human effort wherever possible. On the north Pacific coast, where wooden shipbuilding is unusually active and exceptionally large timbers must be handled, a number of new machines have been developed in the past few months to perform operations heretofore executed more or less crudely by other methods.

Prominent among the machines of this character is the new automatic shipbuilder's planing, beveling and edging machine, developed by the Stetson-Ross Machine Works, Seattle. This company has been actively engaged in the manufacture of heavy-duty woodworking machinery for a number of years. Some of the features of the new planing, beveling and edging machine are shown in the accompanying illustrations.

The machine consists essentially of a beveling side-head, Fig. 1, a beveling top-head, Fig. 2, and a roller table for handling the material. The machine may be driven by an individual motor or it may be connected to an existing system of line shafting.

The 20-inch beveling side-head is shown in Fig. 2 arranged for faying knees. For this operation, a small platform is placed on the carriage and a batten is nailed on the knee in the same manner as when working ceiling or planking. The side-head, which is mounted in a heavy yoke, is equipped with a countershaft provided with an automatic belt tightener. A 7-inch belt is used. This head may be tilted 30 degrees to the right and 20 degrees to the left, and set in an exact position by means of a graduated scale. Most of the bevels used in wooden shipbuilding do not exceed 10 degrees. The side-head is fitted with an adjustable guiding collar that governs the depth of the cut. This head is used for beveling ceiling, forecastle deck beams and planking, including caulking seams, for faying knees and rounding the edges of waterways, main rails, pin rails, etc.

The 48-inch top beveling head may be tilted 15 degrees either way. It may be raised and lowered by power and set by means of a dial that shows thicknesses to sixty-fourths. The roller table or bed is 80 feet long. When motor driven, a 50-horsepower motor is required. The machine weighs 20,000 pounds.

When working ceiling and planking, it is said the machine will displace 18 carpenters on the skids, the net labor saving alone amounting to over $85 per day.

Knees usually are fayed in lots of 10 to 12, first on one side and then on the other, the whole operation requiring only 15 minutes. In beveling ceiling or planking, a complete strake can be laid out at one time and the battens nailed on each timber. The timbers are then placed on roller skids alongside the machine, from which position they may be easily placed on the roller table and run under the knives.

New Shipyard Crane

A 12½-ton crane specially adapted for service in shipyards has just been designed by the Wellman-Seaver Morgan Co., Cleveland. The crane is of the traveling hammerhead type and, as shown in the accompanying illustration, can be built for either a 95-foot or a 105-foot lift.

The crane has a capacity for hoisting and slewing a load of 12½ tons at a maximum radius of 52 feet and 5 tons at a maximum radius of 90 feet. A 12½-ton weight can be hoisted at a speed of 35 feet a minute; a 5-ton weight at 80 feet per minute. The bridge and trolley can travel at 150 feet per minute. The maximum radius of the hook from the center of the tower is 90 feet; the minimum, 14 feet. The overall height is 121 feet 9 inches for cranes built for a 95-foot lift, and 131 feet 9 inches for a 105-foot lift.

The entire boom is mounted on wheels which rotate on a circular track. A heavy center pin carried by cross girders on both the tower and the boom, maintains the proper relation between the stationary and rotating parts.

Two motors are provided for driving the track wheels, each motor being con-

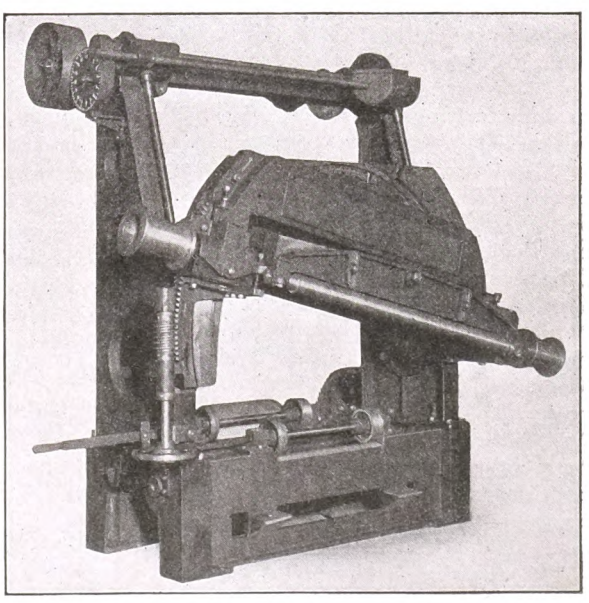

FIG. 1—BEVELING SIDE-HEAD ARRANGED FOR FAYING KNEES. FIG. 2—BEVELING TOP-HEAD SWUNG TO ONE SIDE

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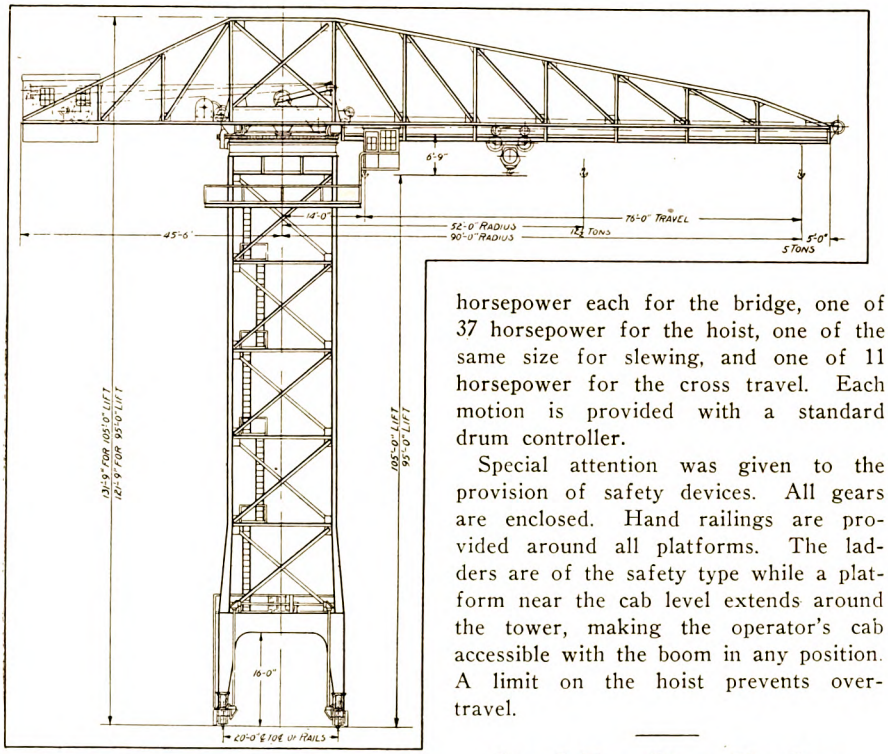


NEW SHIPYARD CRANE

nected to two trucks through spur and bevel gearing. The motors are mounted on platforms on top of the main portal. The hoisting drum is driven through suitable spur gear reductions. Change gears inserted in the hoisting gearing permit the hoisting speed to be increased when handling 5-ton loads and lighter. A double throw jaw clutch controlled by a hand lever is provided for connecting and disconnecting the high and low speed gears.

The hoisting trolley is carried on four single-flanged steel wheels. The trolley travel mechanism is a self-contained unit carried on a cast iron bed plate. The winding drum is driven through a double spur gear reduction, the shafting for which is mounted in cap bearings cast integral with the bed plate. The boom is rotated by means of a cast steel pinion meshing with a rack secured to the circular girder at the top of the tower. This pinion is keyed to a vertical shaft connected to the rotating motor. The entire boom is mounted on two equalizing double wheel trucks and two single wheel trucks.

Foot brakes are provided on both the hoisting and slewing mechanism. Those on the former will hold or lower the maximum lifting load. The brake on the slewing mechanism has sufficient power to hold the boom against a wind load of 10 pounds per square foot. The hoist and bridge motions are equipped with magnetic brakes. Those on the bridge are fitted with dashpots to prevent too quick action in stopping.

The electrical equipment is designed for an alternating current of 440 volts. Five motors are provided—two of 37 horsepower each for the bridge, one of 37 horsepower for the hoist, one of the same size for slewing, and one of 11 horsepower for the cross travel. Each motion is provided with a standard drum controller.

Special attention was given to the provision of safety devices. All gears are enclosed. Hand railings are provided around all platforms. The ladders are of the safety type while a platform near the cab level extends around the tower, making the operator's cab accessible with the boom in any position. A limit on the hoist prevents overtravel.

Steel Bending Brakes

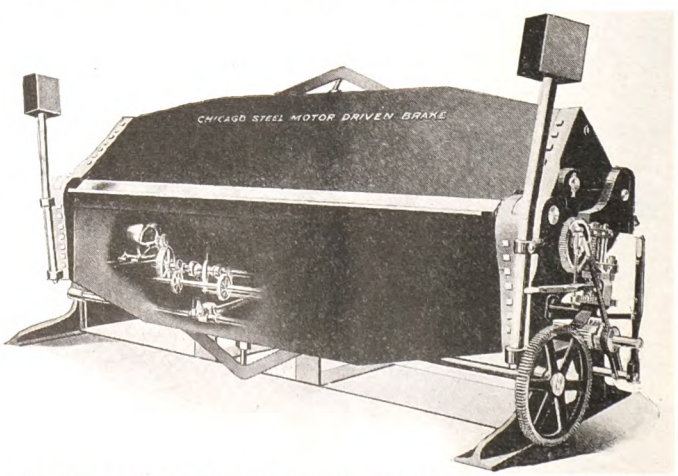
The steel bending brake shown in the accompanying illustration has been developed by the Dreis & Krump Mfg. Co., Chicago, for bending plates up to ½ inch in thickness. Bending brakes have been manufactured by this company for a number of years and are used by a number of shipbuilding companies and navy yards. Machines of various sizes are built to handle sheets and plates from the lightest gage up to ½ inch in thickness.

Steel is used throughout in constructing these brakes. Steel castings and drop forgings are used for hinges and for other parts where great strain is encountered.

The company's steel power bending brakes are made in a wide variety of sizes and capacities. The machines are self-contained. The motor is out of the way, being placed well under the bottom leaf of the brake. For driving, a rawhide pinion on the motor engages a gear on the rear shaft, to which two friction clutches are attached. These regulate the raising and lowering of the apron or bending leaf through the direct and reverse gears. A special feature of these machines is the power clamp which is designed to insure a uniform bend when handling heavy plates by flattening the buckles before the plate is bent. The heavier brakes, as in the one illustrated, are equipped with this power clamping device which raises and lowers the upper jaw and has sufficient power to flatten buckled plates. No adjustment for plates of different thickness is required as the clamp locks at any point.

The adjustment for different thicknesses of material and for sharp and rounding bends consists of an eccentric within the connecting link, the revolving of which increases or decreases the pressure on the sheet or plate. Set and draw screws provide for moving the upper jaw forward or backward. Part of the upper edge is removable from the apron or bending leaf so that close reverse members can be bent. The apron is slightly underbalanced by the weights so that when the clutch is released, the apron comes down of its own weight. The movement of the apron also is controlled by a brake device by means of the clutch lever. The lever actuating the friction clutches is at the end of the machine near the operator. The angle to which the sheet or plate is to be bent is regulated by this lever or by means of an automatic stop gage which can be set to make a number of bends to the same angle. This gage consists of an adjustable collar on the steel gear-cut rack that operates positively in raising the apron. When the apron is lowered to the extreme point, this clutch disengages itself automatically.

Among different shipbuilding firms using these brakes are the Detroit Shipbuilding Co., Manitowoc Shipbuilding Co., Ames Shipbuilding Co., Union Iron Works, San Francisco, and the Lake Torpedo Boat Co., Bridgeport, Conn., as well as by various government navy yards.



12-FOOT BRAKE FOR BENDING ½-INCH PLATE, SHOWING DRIVE ARRANGEMENT AND POWER CLAMP

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